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OVARIAN TUMORS:

THEIR

PATHOLOGY, DIAGNOSIS, AND TREATMENT,

ESPECIALLY BY

OVARIOTOMY.

LEED
SCHOOL
MEDIC

BY

E. RANDOLPH PEASLEE, M. D., LL. D.,

PROFESSOR OF GYNÆCOLOGY IN THE MEDICAL DEPARTMENT OF DARTMOUTH COLLEGE; ATTENDING SURGEON OF THE NEW YORK STATE WOMAN'S HOSPITAL; CONSULTING PHYSICIAN TO THE STRANGERS' HOSPITAL; CORRESPONDING FELLOW OF THE OBSTETRICAL SOCIETY OF BERLIN, AND OF THE GYNÆCOLOGICAL SOCIETY OF BOSTON; HONORARY MEMBER OF THE LOUISVILLE OBSTETRICAL SOCIETY; PRESIDENT OF THE NEW YORK ACADEMY OF MEDICINE, ETC., ETC., ETC.

WITH FIFTY-SIX ILLUSTRATIONS ON WOOD.

PROPTER OVARIA MULIER EST.

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TO

THE MEMORY OF

EPHRAIM McDOWELL, M.D.,

THE FATHER OF OVARIOTOMY,

AND TO

THOMAS SPENCER WELLS, ESQ.,

THE GREATEST OF OVARIOTOMISTS,

THIS VOLUME

IS RESPECTFULLY DEDICATED.

LEEDS SCHOOL OF MEDICINE

PREFACE.

The following work was undertaken from a conviction that a practical treatise, in the English language, upon the subjects of which it treats, is greatly needed. While several writers have published their individual experience, more or less extensive, as ovariotomists, no work has appeared of broader scope, which proposes to cover the whole ground, so far as is practicable, within the limits of a single volume. The only apparent exception to this statement is Mr. I. B. Brown's monograph on "Ovarian Dropsy," of which, however, the greater part is devoted to his own cases.

The author has also thought that a considerable amount of study of this subject for twenty-five years past, and especially since his first experience in ovariotomy in 1850, might qualify him to impart some information of value, not otherwise obtainable, without more labor than most of the profession can devote to this subject.

The defects of the present work are probably as patent to the author as they will become to the reader. Incessant professional labor has rendered it impossible for him to comply with the injunction of the Latin poet in respect to time employed in composition and revision; a statement not intended, however, to avert a severe criticism, but merely to explain why it has been so frequently invited. But he has not hesitated to give explicit expression to his own conclusions upon all practical points, and the reasons upon which they are founded, that they may be adopted or rejected upon rational grounds. The time for oracular utterances in our art has passed; and every magisterial assertion should be challenged. He has also drawn from his own experience whenever it afforded a better illustration of a special point than he could obtain from another source.

The first part of the work includes the normal anatomy of the ovary, and the pathological anatomy, the pathology, diagnosis, and treatment of ovarian tumors, excepting by ovariotomy. The second part is devoted to ovariotomy alone—including its history, statistics, practical details, and after-treatment. It aims to decide all practical questions by the aggregate experience of all ovariotomists up to the present time.

The author here records his grateful acknowledgments to all the gentlemen experienced in ovariotomy, both at home and abroad, who have so courteously and kindly responded to his inquiries while preparing the present work.

E. R. P.

29 Madison Avenue, New York, *July* 20, 1872.

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OVARIAN TUMORS AND OVARIOTOMY.

PART I.

NORMAL ANATOMY, PATHOLOGY, AND TREATMENT OF OVARIAN TUMORS—EXCEPTING OVARIOTOMY.

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OVARIAN TUMORS.

CHAPTER I.

NORMAL ANATOMY OF THE HUMAN OVARY AND OVIDUCT.

SECTION I.

ANATOMY OF THE OVARY.

The ovaries appear to the unaided eye to lie between the two folds of the broad ligament, and are attached to the uterus by the ovarian ligaments. The latter are flattened, cylindrical cords, two or three lines in diameter, and half an inch to even two inches long; and are composed of non-striated muscular fibre and connective tissue. They extend from the inner extremity of the ovary to the uterus; becoming continuous with the latter on its sides and near its angles, at a point just below and behind the oviducts, or Fallopian tubes. The right ligament is the longer in about three-quarters of the cases. The left ovary is generally found in close proximity to the rectum, and a part of its posterior surface connected with it.

The ovaries are, therefore, normally situated high in the pelvis; their outer extremities almost touching the lateral walls of the pelvis, one inch to one and a half inch below the linea arcuata. During pregnancy, however, they are elevated into the abdomen in proportion as the size of the uterus increases, and at the close of gestation are below the centre of the uterus and in contact with its sides, and therefore not injured during parturition. Immediately after parturition they lie in the iliac region, where, indeed, they are sometimes retained during life by inflammatory adhesions. They are prominent on the posterior, but not on the anterior surface of the broad ligament. Hence, when somewhat enlarged by cystic disease, the mass falls backward behind the uterus, and hangs from the broad ligament as if from a mesentery.

The average size of the ovary in the adult may be said to be that of an almond. But it differs much at different periods of life, being largest in the virgin at the commencement of puberty; when it is one and a third to one and a half inch long, three-fourths to one inch deep (or vertically), and five lines thick (or antero-posteriorly), and its average weight is eighty-seven grains. Now, also, it is plump, and has a smooth surface; but the escape from it of one or more ova every month in connection with menstruation, through ruptures of the ovisacs within its substance, at the same time diminishes its size, and produces a fissured, scarry appearance of the exterior; so that, by the time menstruation ceases, or after thirty years or more of such experience (from about fifteen to forty-five years of age), the size of the organ has been reduced to one-half its original dimensions. In old age it often weighs not more than fifteen grains; and sometimes no vestige of it remains except the vessels formerly distributed to it.

The ovary somewhat resembles the testis, though averaging less than one-fourth of its bulk. Its form is peculiar (Fig. 1). Convex on its anterior, and much more so on its posterior surface, the upper border is straight, while the lower, traced from the pointed inner extremity, merging in the ovarian ligament, to the outer extremity and upper border, very nearly describes a semicircle. It is at the upper or straight border that the vessels and nerves enter the organ.

Minute Structure of the Ovary.—Supported by the broad ligament, and projecting through its posterior layer (for the ovary is not covered by the peritonæum), the ovary presents remarkable modifications of structure at different epochs of life. The following description applies to the thirty to thirty-five years of menstrual life, i. e., from puberty to the menopause.

The strong envelope of the ovary (tunica albuginea) is resolved by Waldeyer into three layers, to be specified farther on.

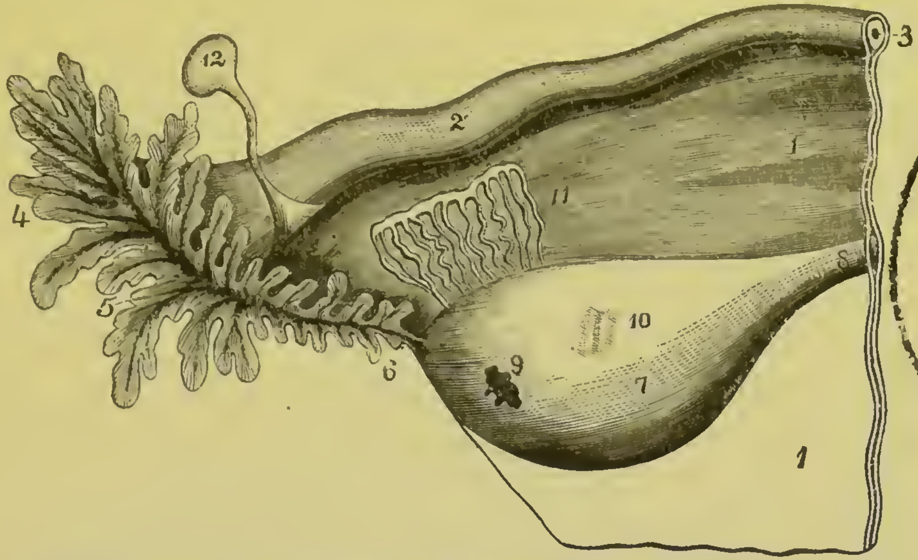

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FIG. 1.—OVARY, PAROVARIUM, AND FALLOPIAN TUBE, OF THE LEFT SIDE.

1, Broad ligament; 2, Fallopian tube, or oviduct; 3, its canal; 4, its fimbriated extremity; 5, mouth of the latter, or pavilion; 6, process attached to the ovary, 7; 8, ovarian ligament; 9, orifice from which an ovum has recently escaped; 10, a cicatrix; 11, parovarium; 12, remains of the duct of Müller. From a virgin of about eighteen years of age.—(Leidy.)

It is covered externally merely by a peculiar epithelium, not a continuation of that of the peritonæum; and is lined internally by the vascular zone.

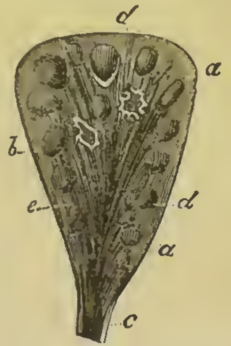

FIG. 2.—TRANSVERSE SECTION OF AN OVARY, FROM A CASE IN THE FIFTH MONTH OF PREGNANCY.

a, b, ovisacs; *c*, ovarian ligament; *d*, fibrous coat of the ovary; *e*, stroma. In the interior two old corpora lutea are visible.—(Leidy.)

In a vertical section there appears beneath the outer and firmest layer of the tunica albuginea—

1. A grayish-red, tolerably firm, fibrous network or stroma, of embryonic connective tissue, together with vessels and nerves extending through every portion of the organ.

2. Numerous closed round sacs or vesicles—the so-called Graafian follicles, lying everywhere between the meshes of the stroma just mentioned (Fig. 2). These are the peculiar structural element of the ovary, and will be particularly considered.

The ovary is supplied with blood mainly by the ovarian (spermatic) arteries, but partly also by the uterine. Its scanty supply of nerves is derived from the renal and the superior aortic plexus (the spermatic).

The important fact that the ovary is not covered by the peritonæum, nor by its epithelium, but has a special epithelium of its own, has recently been demonstrated both anatomically and developmentally by Waldeyer,[1] of Breslau. He shows that the fine, but distinct serrated line, mentioned by Dr. A. Farre,[2] but not correctly explained by him, which surrounds the base of the ovary, indicates precisely where the peritonæum terminates. The naked eye, even, discovers that most of the surface

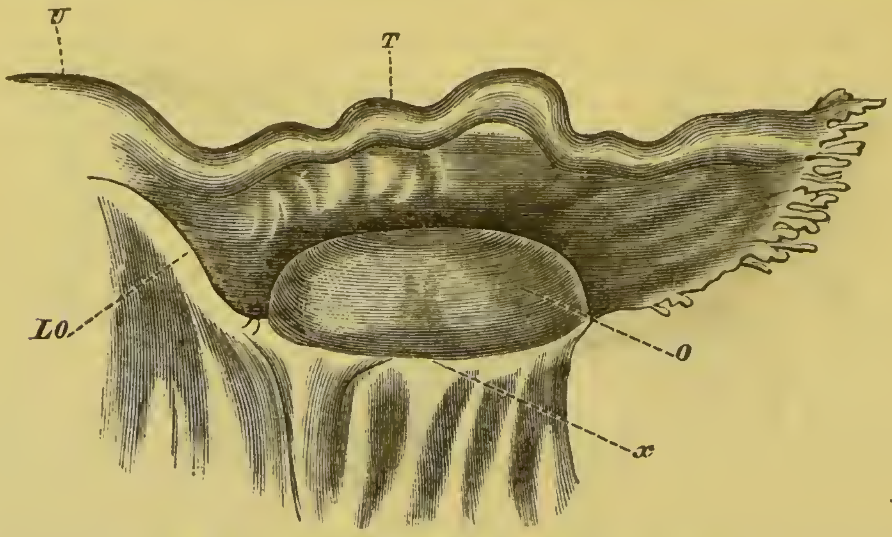

FIG. 3.—OVARY OF A GIRL NINETEEN YEARS OLD.
U, uterus; *T*, oviduct; *L O*, ligament of the ovary; *o*, ovary turned downward; *x*, peritoneal line.—(Waldeyer.)

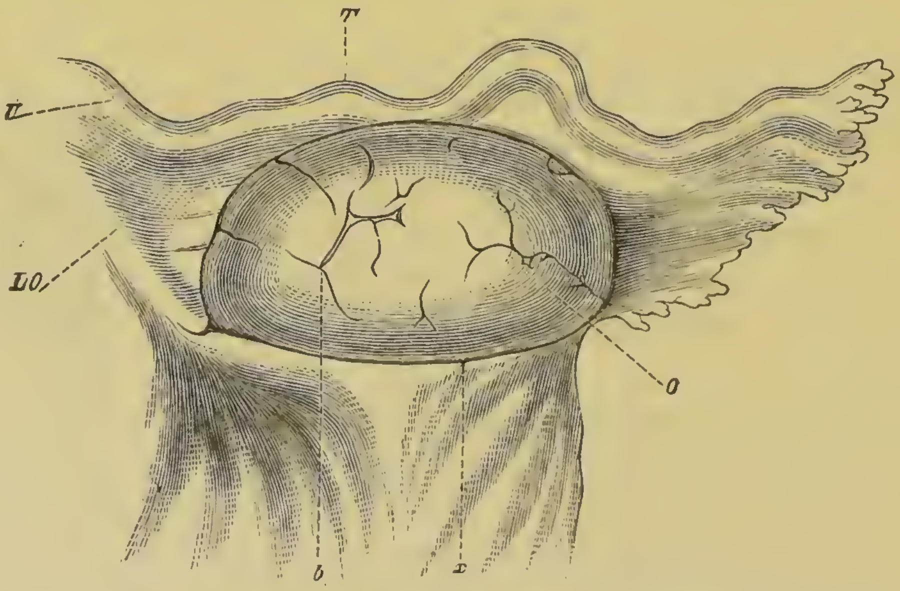

FIG. 4.—OVARY OF A GIRL TWENTY-FOUR YEARS OLD.
The letters indicate the same parts as in Fig. 3; *b*, cicatrix of a ruptured ovisac.—(Waldeyer.)

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[1] "Eierstock und Ei," von Wilhelm Waldeyer, Dr. Med., Leipzig, 1870.

[2] "Cyclopædia of Anatomy and Physiology," Art. Uterus, p. 548. The sharp termination of the parenchymatous zone against the hilum of the ovary is described by His, p. 73.

of the ovary is dull, not shining, grayish red, and slightly translucent in quite recent specimens, like a mucous membrane with but few vessels, covered by a thin stratum of epithelium; while below the border-line the surface is smooth and shining, like all parts covered by a perfect serous membrane. This line is not so distinct after the ovary assumes a cicatricial appearance in consequence of repeated ovulations, as it is in younger individuals (Figs. 3 and 4). It, however, reappears in old age, with the senile shrinking of the ovary (Fig. 5); and Waldeyer has seen it in the smallest mammalia (the Guinea-pig) which he could obtain (p. 5). It is also found to be impossible to dissect off the peritoneal covering beyond this border-line. Moreover, the cells which are obtained by scraping the free surface of the ovary, are easily detached, without injury to the subjacent layer, as in case of a mucous membrane. On the other hand, the epithelial cells of a serous membrane are always separated with difficulty, whether in case of the peritoneal epithelium or of the endothelium of blood-vessels. But, with a power of three hundred diameters, the distinction between the two sides of the border-line becomes quite marked and conclusive. The scaly

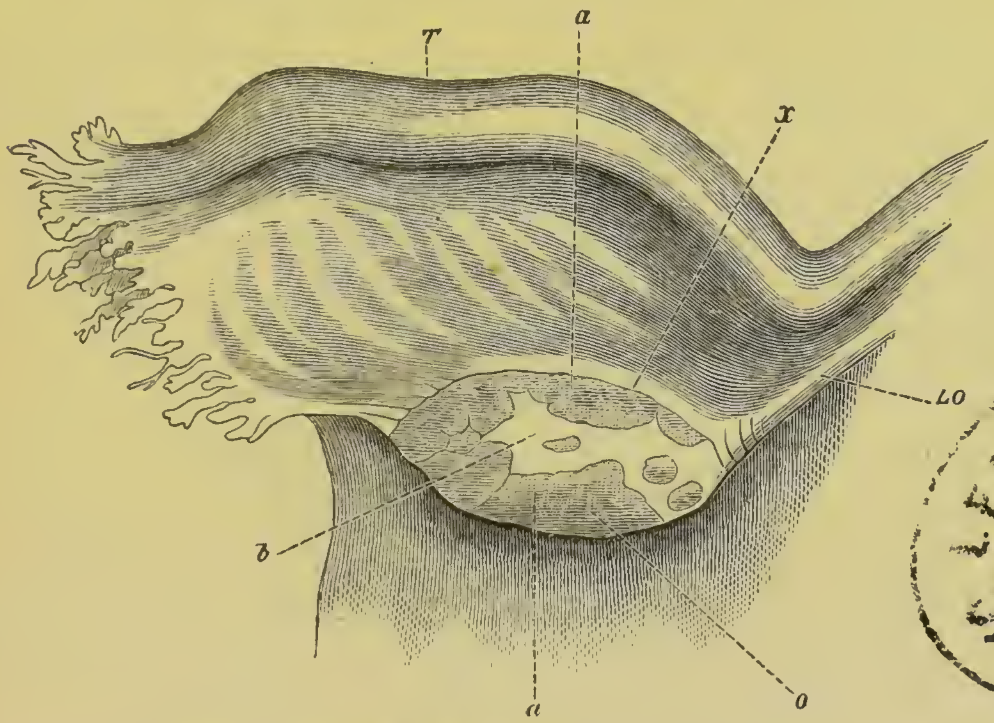

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FIG. 5.—Ovary of a Woman Seventy-five Years old.

a, *a*, portions of the surface still covered with epithelium; *b*, cicatricial and withered portion. Letters indicate the same parts as in Fig. 3.—(Waldeyer.)

peritoneal epithelium has large round nuclei at regular and relatively long distances, while the cylinder epithelium of the ovary, with its regular mosaic, resembles a non-ciliated mucous surface. Still more striking are these peculiarities rendered by the use of a solution of nitrate of silver (25 per cent.) or of carmine. The former gives (1) a browner color on the ovarian side of the border-line; and (2) shows the peculiar flexuous lines between the flat, well-contoured cells of the peritoneal epithelium; while (3) on the other side of the line, the sharply-defined angular outlines of the cylinder-cells appear (Fig. 6). At regular distances, also, on the ovarian surface, dark, funnel-shaped depressions, like the stomata of the leaves of plants, appear; and which are actually the openings of the follicles described by Pflüger, and which bear his name. The affinity of this epithelium to that of a mucous membrane is also strikingly confirmed by Waldeyer's statement that, in some exceptional instances, the human ovarian epithelium is found to be directly

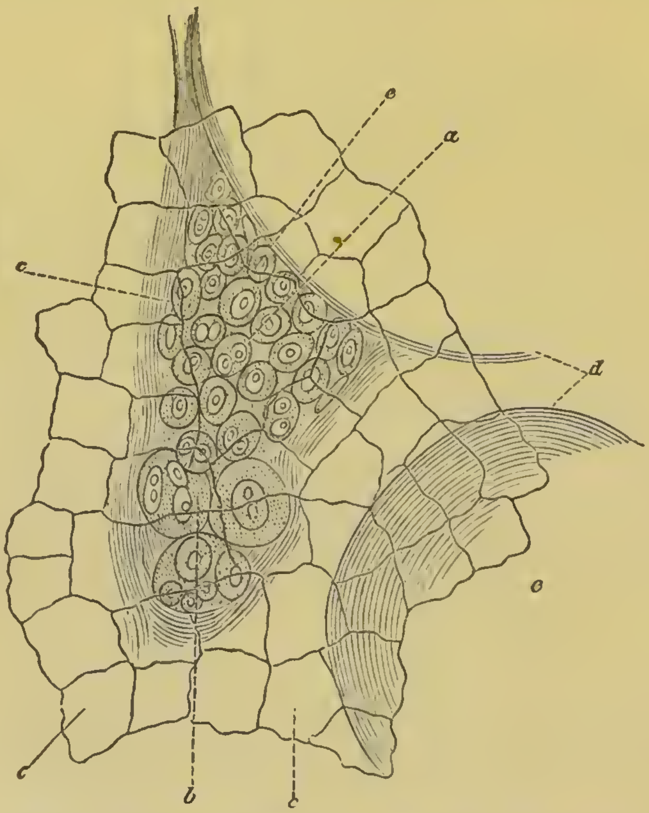

FIG. 6.—From the Surface of the Ovary of a Frog.

a, groups of roundish. epithelial cells, the first commencement of the ova and follicular epithelial cells; *b*, smaller collections of similar cells of various sizes, the nuclei of which sometimes contain two nucleoli. The larger cells are the primordial ova; *c*, *c*, peritoneal lining; *d*, contours of larger follicles; *e*, *e*, limit of the peritoneal epithelium.—(Waldeyer.)

continuous with the ciliated epithelium of the fimbriæ of the oviducts; though there is usually a white, shining band, covered by peritonæum, and only $\frac{1}{25}$ inch (one millimetre) in breadth, interposed between them. In the rabbit he finds this continuity to be the rule and not the exception; while in the hog it is not uncommon.[1] That it is actually the epithelium of a mucous membrane will be shown when I speak of the development of the ovary.

The dimensions of the cells of the cylinder ovarian epithelium Waldeyer finds to be as follows (Fig. 7): In a fœtus thirty-two weeks old, $\frac{1}{1666}$ to $\frac{1}{1388}$ inch long, $\frac{1}{5000}$ to $\frac{1}{4166}$ inch broad. In a woman fifty years old, $\frac{1}{2083}$ inch long, $\frac{1}{1166}$ inch broad, and with nuclei $\frac{1}{6250}$ to $\frac{1}{4166}$ inch.[2]

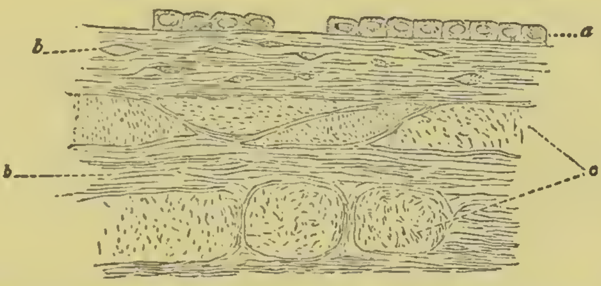

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FIG. 7.—PIECE OF VERTICAL SECTION OF OVARY OF A COW.
a, epithelium; *b*, longitudinal lines of the tunica albuginea; *c*, transverse layers.—(Waldeyer.)

The nuclei are large and well defined, while nucleoli are rarely to be seen. There is never more than a single layer of cells in the ovarian epithelium.

Rouget alone has also described a bulb of the ovary, and discovered a muscular apparatus rendering it, he believes, an erectile organ (Boinet,[3] p. 14).

The Ovisacs, or Graafian Vesicles.—Both Vesalius and Fallopius observed these structures before De Graaf. De Graaf accurately described them two hundred years ago (1672), and they were until recently called, from him, Graafian follicles. They are vesicles, but not follicles in any sense; and I therefore apply the term follicles to them, when at all, under protest. In 1827, however, it was first distinctly pointed out, by Von Baer, that each mature ovisac contains a mature ovum; and recently, therefore, these bodies have been called, appropriately, ovisacs. They are most numerous near the periphery, at all ages; and found only there in infants and young subjects. Sometimes, after puberty, they are, however, found as deep as the base of the gland. The number of ovisacs in a single ovary is immense, they being of all sizes, from the mature sac, which is from one-quarter to one-third of an inch in diameter, down to those seen only by the aid of the microscope. Before Dr. Martin Barry ascertained the existence of these multitudes of undeveloped ovisacs, it was taken for granted that only those sacs, which range from one-quarter down to perhaps one-sixteenth of an inch in diameter, are ovisacs; and therefore that there are only from twenty to thirty in each ovary in young women; while in old women there are only from two to five, or none at all. Kölliker admits from thirty to one hundred, or even sometimes three hundred ovisacs, in each ovary in young women, since he included those smaller, or down to one forty-eighth of an inch in diameter. The largest ovisacs are nearest the surface of the ovary, as will be explained farther on.

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[1] Waldeyer, pp. 6, 7.

[2] Waldeyer, p. 10.

[3] "Traité pratique des Maladies des Ovaires," etc. Par A. A. Boinet. Paris, 1867

The recent investigations of M. Sappey respecting the number of ovisacs, developed and undeveloped, are very interesting. He finds that a young woman of from sixteen to eighteen years has over three hundred thousand ovisacs in each ovary, or nearly seven hundred thousand in both; a number sufficient, if their contained ova were fecundated, to people four such cities as Lyons, Marseilles, Bordeaux, and Rouen! Henle estimates the original number of ova at not less than thirty-six thousand for each ovary. From one to three are lost at each menstrual period.

The structure of an ovisac—of course a developed ovisac, and not the microscopical—presents for consideration:

I. The wall of the ovisac;
II. Its contents.

I. The *wall* of the ovisac consists of three layers (Baer), Fig. 8.

a. A fibrous coat, an offset from the stroma of the organ, and connected with it by loose connective tissue. This contains the capillary vessels, which, with the nerves, penetrate to the

b. Proper membrane or basement-membrane (Kölliker).

c. An internal layer of polyhedral cells $\frac{1}{1500}$ to $\frac{1}{1000}$ of an inch thick—a proper epithelium, called the membrana granulosa. On the side of the ovisac, toward the surface of the ovary, is an accumulation of these cells, producing an eminence on the epithelium one thirty-sixth of an inch broad, which is called the germinal eminence. This encloses the ovum; and to this I return when speaking of the contents of the ovisac.

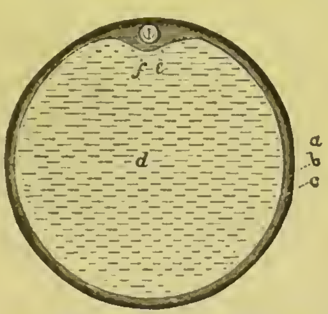

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FIG. 8.—OVISAC OF THE SOW.

a, external; *b*, internal layer of the fibrous membrane of the ovisac; *c*, membrana granulosa; *d*, fluid contents of the ovisac; *e*, germinal eminence, a projection of the membrana granulosa; *f*, ovum with a zona pellucida, vitellus, and germinal vesicle. Magnified about ten diameters.—(Kölliker.)

II. The *contents* of the ovisac consist of—
- *a.* The fluid in the ovisac.
- *b.* The ovum itself.

a. The *fluid* in the ovisac is a light-yellowish, serous liquid; almost always containing isolated granules, nuclei, and cells detached from the lining epithelium, or membrana granulosa.

b. The *ovum* (egg or germ) lies among the cells of the germinal eminence on the side of the ovisac toward the surface of the ovary, as before stated; and was first distinctly pointed out by Von Baer in 1827 (Fig. 9).

The ovum is merely a cell $\frac{1}{96}$ to $\frac{1}{120}$ of an inch in diameter—not more than $\frac{1}{30}$ of the diameter of a mature ovisac, with—

1. An elastic, structureless wall, $\frac{1}{3000}$ to $\frac{1}{2400}$ of an inch thick—the vitelline membrane[1] (Fig. 9, *a*).
2. A contained viscid fluid, of a pale-yellow color, containing a multitude of clear and fatty granules—the yolk.
3. And in the fully-formed yolk a large, clear nucleus, $\frac{1}{600}$ of an inch in diameter—the germinal vesicle.

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[1] Seen under the microscope as a transparent ring around the ovum, this layer is called the zona pellucida.

4. And, finally, in the germinal vesicle a nucleolus, $\frac{1}{4000}$ of an inch in diameter—the germinal spot.

The ovisacs, thus constituted, are, in a healthy, non-pregnant woman, from the age of fifteen or less, in this climate, to forty-five years, constantly being matured. When mature, they become prominent upon the surface of the ovary, are one-third of an inch or more (even one-half an inch) in diameter; and, at length, in connection with the menstrual flow, they burst and set free the contained ovum, placed, as we have seen, so as to be thus discharged with certainty from the ovisac (Fig. 10). The rupture produced by the dehiscence of the ovisac extends through its own walls, the fibrous coat of the ovary, and the epithelial investment of the latter. It is from one-sixth to one-fifth of an inch long, sometimes less (Kiwisch,[1] p. 12). Thus released, the ovum enters the open extremity of the oviduct (or Fallopian tube), and is by it carried onward into the uterus. The development and detachment of the ovum in this manner constitute

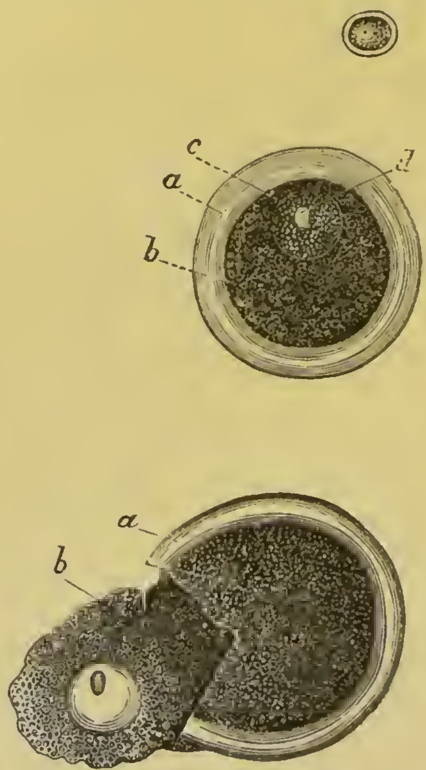

FIG. 9.—MAMMALIAN OVA.

Upper figure an immature, and the lower a mature ovum; *a*, zona pellucida; *b*, yolk; *c*, germinal vesicle; *d*, germinal spot. In the lower figure the zona pellucida, *a*, is ruptured, and the yolk granules, *b*, and the germinal vesicle have escaped through the opening.—(Coste.)

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[1] On the Diseases of the Ovaries. Translated by Dr. John Clay. London, 1860.

what is termed *ovulation;* and the cavity left in the ovary—the open and now empty ovisac, being occupied by blood, which subsequently changes its color—becomes a "corpus luteum" (Fig. 11).

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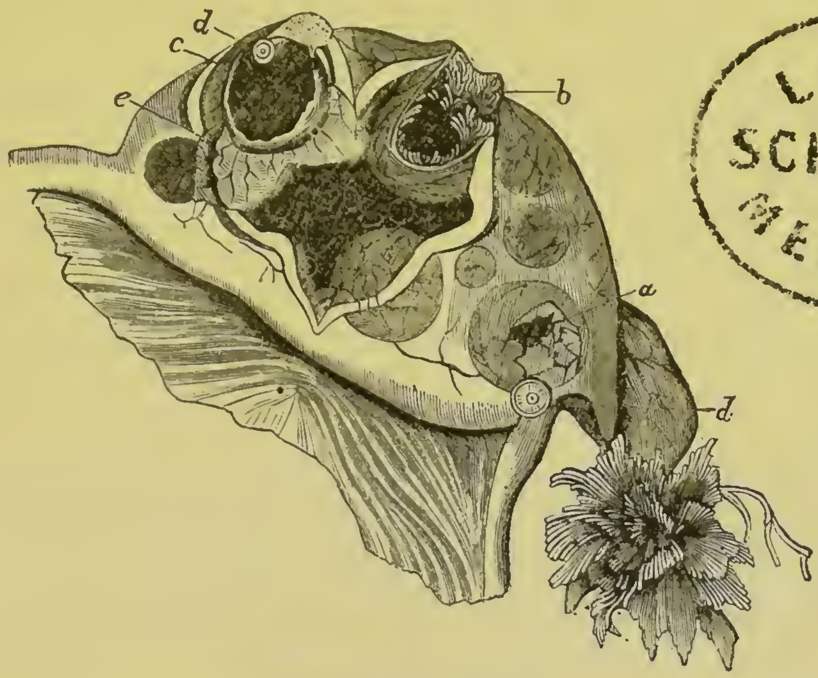

FIG. 10.—HUMAN OVARY.

a, ovisac with opening; *b*, inner lining of the ovisac (membrana granulosa); *c*, outer portion of the same; *d*, ovum; *e*, vascular wall of ovisac.—(Coste.)

The cause of the bursting of the ovisac is not understood, and may as well be accepted as an ultimate fact. Rindfleisch suggests that a chemical substance is formed at the catamenial period, which, swelling, bursts the capsule, as peas may in the same way be made to burst a skull; while Rouget asserts the

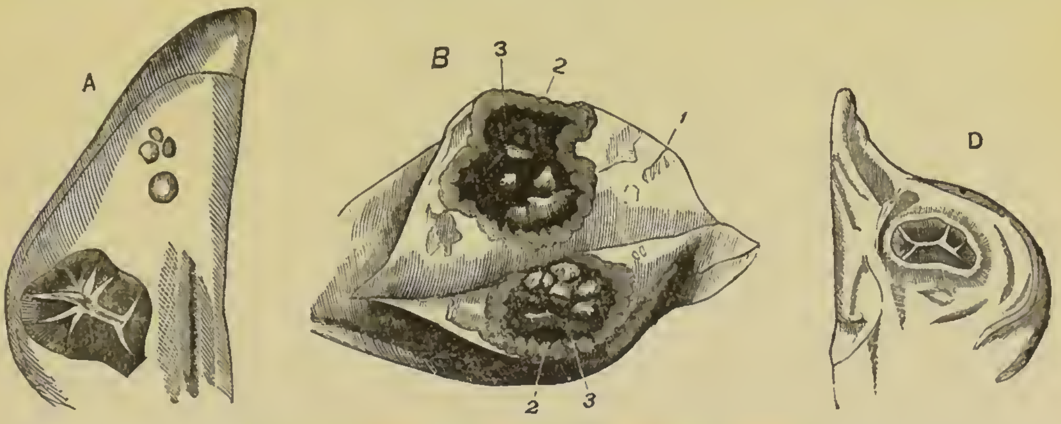

FIG. 11.—CORPORA LUTEA OF DIFFERENT PERIODS.

B, corpus luteum of about the sixth week after impregnation, showing its plicated form at that period.—1, substance of the ovary; 2, substance of the corpus luteum; 3, a grayish coagulum in its cavity (after Dr. Patterson); *A*, corpus luteum two days after delivery; *D*, in the twelfth week after delivery (after Dr. Montgomery).

discovery of a muscular apparatus in the ovary which presides over the expulsion of the ovum from the latter, and its transmission into the Fallopian tube.

The final destiny of the ovum depends on its being fecundated, or not, by the spermatic fluid; it being detained in the uterine cavity during the period of gestation in the former case, and being lost and expelled among the secretions of the uterus and vagina in the latter. The fecundated ovum increases in size while traversing the oviduct; but, since the latter has a diameter at its narrowest portion (uterine extremity) at least three times as great ($\frac{1}{48}$ of an inch) as that of the original ovum, the latter but very seldom fails to enter the uterine cavity.

The Parovarium (Organ of Rosenmüller).—The paroöphoron, or parovarium (Fig. 1), is a relic of embryonic life, and is the analogue of the epididymis of the male. Lying also between the folds of the broad ligaments, it consists of about twenty whitish tortuous tubes diverging from the upper and outer portion of the ovary to a larger trunk near to and parallel

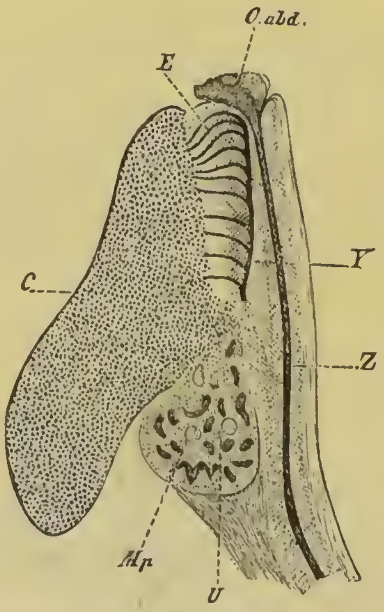

FIG. 12.—INTERNAL SEXUAL ORGANS OF A HUMAN FEMALE FŒTUS THREE AND A HALF INCHES (NINE CENTIMETRES) LONG, MAGNIFIED TEN TIMES.

C, ovary; *Z*, oviduct; *O abd.*, abdominal opening of oviduct; *E*, epoöphoron (epididymis of Wolffian body); *Y*, Wolffian body; *U*, paroöphoron (primordial kidney of Wolffian body); *Y*, Wolffian body disappearing farther downward; its position is still indicated by some thickened tissue which is united with the thickened connective tissue around the oviduct; *Mp.*, Malpighian corpuscles.—(Waldeyer.)

with the oviduct. It is narrow toward the ovary and about one inch broad toward the oviduct, and hence is also called the corpus conicum. Dr. A. Farre remarks that it exhibits parallel stages of development and retrogression, with its corresponding ovary at different periods of life. It is what remains in woman of the Wolffian body.

Another relic of embryonic life is a small sac, scarcely larger than a drop of water (three lines in diameter), which is usually found attached by a slender pedicle, one-half inch long or more, near the fimbriated extremity of the oviduct. It is what remains of the canals of Müller; from which the uterus, oviduct, and vagina, are originally developed (shown at 12, Fig. 1).

SECTION II.

DEVELOPMENT OF THE OVARY.

Having studied the development of the sexual organs of the female from the amphibia up to man, Waldeyer finds that, while the urinary apparatus is always developed from the epithelium of the Wolffian canals, the ovary and the oviduct are formed from the germinating epithelium, which together with the Wolffian bodies is found in the so-called middle lamina of Remak. He finds that this epithelium always constitutes a part, greater as the animal is lower in the scale, of the lining of the peritoneal cavity;[1] and divides into two layers, one producing the ova, more or less clustered together in an ovary (Fig. 6), and the other forming a duct—Müller's duct—which represents the beginning of the future oviduct. In the lower animals the ovary and the duct are, therefore, continuous; while in the mammalia they are separated by the development of a voluminous kidney, so that a band of peritonæum intervenes, as has been stated. Originally, therefore, the epithelium of the human ovary and the Fallopian tube is the same, and is that of a mucous membrane. The ovary and the pavilion of the Fallopian tube are, as it were, pushed through the peritonæum into its cavity, the peritonæum closing accurately around them.

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[1] In the frog, over one-half of the peritoneal cavity is covered by this—the ovarian epithelium, and here it is also ciliated—and the rest of it by the peritoneal epithelium; the oviducts opening just below the pericardium. The remaining portion of the peritoneal cavity is a great lymph-sac, as first announced by Von Recklinghausen. The germinal surface is, however, divided up into islets by intersecting bands of the peritonæum. (Fig. 6.)

It is not improbable that the human peritoneal cavity is at first lined almost entirely by the germ-epithelium, since in some hermaphrodite animals it contains the ova, the semen filaments, and lymph, at the same time; the oviduct extending directly from this cavity to the exterior of the body. In the highest animals the germinal surface is reduced to a minimum;[1] and the lymph-surface, or lymph-sac, becomes proportionally immense. The lymph-corpuscle (or the amœboid body), therefore, becomes a diagnostic element of the peritoneal fluid.

In the human fœtus of eleven or twelve weeks, at which time the sex is first distinguishable, Waldeyer finds tubular passages extending downward from the epithelium into the vascular stroma beneath, which is still but slightly developed, and abounds in short, roundish, spindle-shaped cells. These passages are Pflüger's sacs, as shown in Fig. 13. The ovaries are now proportionally large, but smaller than the testes, and, like the latter, lie in the lumbar region, though more horizontally placed; their inner extremities not being completely separated by the rectum.[2]

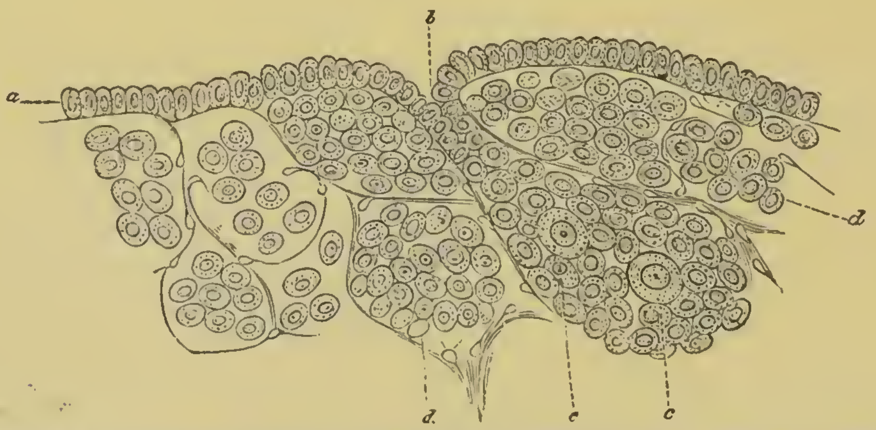

FIG. 13.—Piece of Vertical Section of the Ovary; Human Embryo Twelve Weeks old, magnified Three Hundred Times.

a, epithelium; *b*, opening of a tube; *c*, larger primordial ova; *d*, spherical masses of ova.—(Waldeyer.)

At thirty to thirty-two weeks the ovaries are larger, and already resemble externally the ovaries of the new-born. The epithelial surface of the ovary is sharply distinguished at the border-line from the peritonæum. The ovary has a grayish-red color, exactly like that of the mucous membrane of the Fallopian tubes, excepting that it has fewer blood-vessels. The indented appearance of the surface, also (Fig. 14), contrasts strikingly with the smooth and tense surface of the ovary at two to fifteen years of age.[1]

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[1] Page 158.

[2] Boinet, page 8.

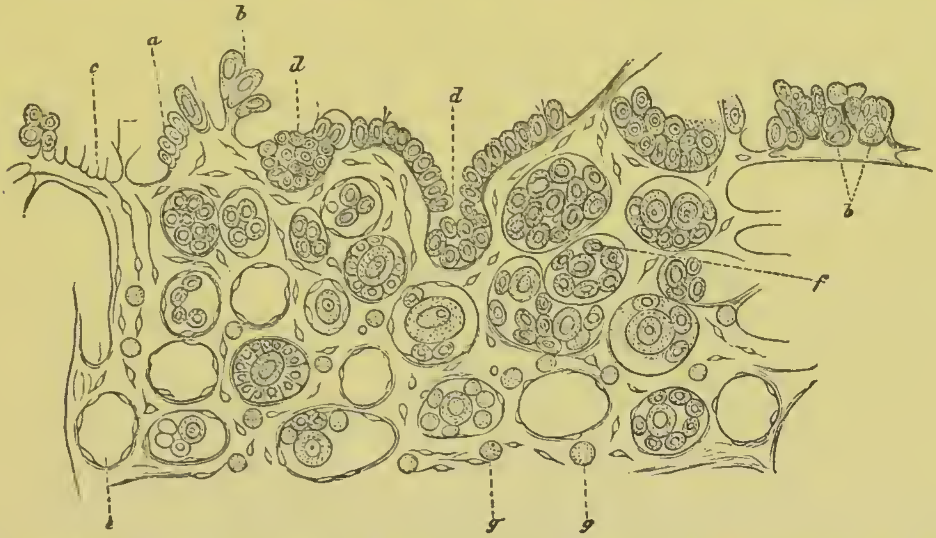

FIG. 14.—Vertical Section through the Ovary of a Human Fœtus Thirty-two Weeks old.

a, *a*, epithelium; *b*. *b*, last developed ova-cells which can already be recognized in the epithelial layer; *o*. small trabeculæ of connective tissue growing up in the epithelial layer; below, primordial ovisacs circumscribed by small cells of connective tissue; *f*, groups of epithelial cells (spherical masses of ova) already embedded, with several larger cells (primordial ova) below; *g*, nucleated-cells. —(His.)

The long tubes above mentioned having freely anastomosed, at birth (Fig. 15), they enter the epithelium (Fig. 16) with narrow

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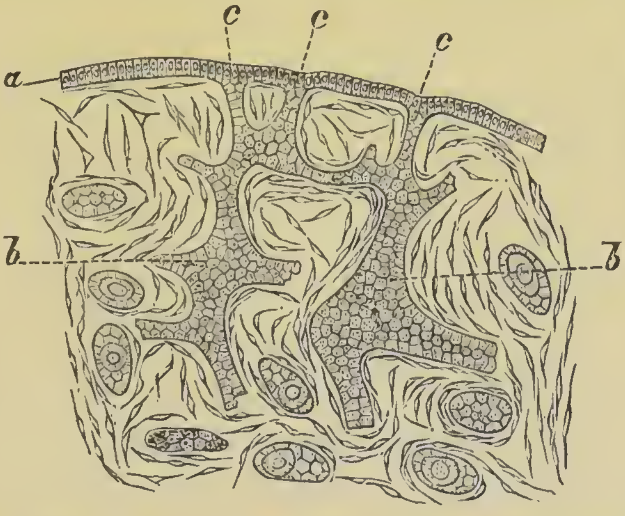

FIG. 15.—Vertical Section from the Ovary of a New-born Child.

a, epithelium; *b*, *b*, ovarian tubes connected with epithelium at *c*, *c*, *c*. Magnified one hundred and twenty times.—(Waldeyer.)

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[1] Page 21, Waldeyer.

openings, and pass downward into groups of primary follicles of racemose arrangement. The epithelium of the ovary is thus to be regarded as the source of the ova, since the walls of the ova as well as the tubes are merely extensions of the epithelium; and all the epithelial cells might become ova did not the outer ones actually perish in the peritoneal cavity.

At birth the ovaries contain an abundance of ova from $\frac{1}{1055}$ to $\frac{1}{450}$ inch in diameter (averaging $\frac{1}{625}$). The ovisac now fits closely upon the ovum, as it contains no fluid, and the germinal membrane directly upon the germinal vesicle, within which is the germinal spot. The vitellus is faintly granular, and in some ova scarcely distinguishable.[1]

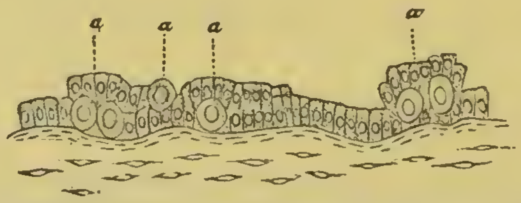

FIG. 16.—EPITHELIUM FROM THE OVARY OF A NEW-BORN CHILD, with several of the latest primordial ova, *a*, *a*, *a*, magnified about two hundred and forty times.—(Waldeyer.)

At two and half years the fibrous tissue is so developed as to cut off communication between the epithelium above it, and the stroma below; and from this time no indentations descend into this layer, and the ova-tubes and ova are no longer formed, though here and there a primary follicle may still be seen.[2]

After puberty and until the menopause, Waldeyer finds the following layers in a section through the ovary:

A. The parenchymatous zone externally, containing (1) the epithelium, (2) three layers of the fibrous tunic, (3) the zone of younger follicles, and (4) zone of older and larger follicles.

B. The vascular zone.[3]

Waldeyer found no follicular indentations upon the surface of the ovary at the end of four years after the menopause; though the cicatricial, fissure-like indentations produced by the escape of ova during menstruation may be mistaken for follicles, since they also are lined by epithelium.[4]

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[1] Dalton, "Human Physiology," fourth edition, pp. 651, 652.

[2] Page 28, Waldeyer. [3] Page 29. [4] Page 30.

The ovarian arteries anastomose freely with those of the uterus, and are very tortuous in the substance of the ovary.

The ovarian veins form an intimate plexus (plexus pampiniformis) in the broad ligaments; from which the main trunks pursue the course of the ovarian arteries, merging on the right side into the inferior vena cava, and on the left into the left renal vein.

The numerous lymphatics of the ovary terminate in the lumbar glands, surrounding the inlet of the pelvis.

The final distribution of the nerves of the ovary has not been made out. They are probably not sent beyond the termination of the vessels in the membrana granulosa, where as vaso-motor nerves they would modify the nutrition of the ovisac and indirectly of the ovum. Beyond this point, and even in the ovum, they could avail nothing further than this; since the ovum is to be entirely isolated and removed from the ovisac. Though derived directly from the great sympathetic, the nerves of the ovary doubtless also contain sensory fibres from the spinal cord, but in its normal state the ovary is not an organ very sensitive to pressure.

SECTION III.

THE OVIDUCTS, OR FALLOPIAN TUBES.

The oviduct in the adult human female is a more or less flexuous tube, from four to five and three-fourths inches long, lying in front of, and above, the ovary, between the folds of the broad ligament. Having a diameter within of only about one-fiftieth of an inch where it commences at the upper angle of the uterine cavity, it extends thence outward with an increasing calibre, till it terminates in a trumpet-shaped opening, the pavilion, surrounded by the fimbriæ, or fringe. This opening is in such relation to the outer extremity of the ovary as to be capable, through the action of one of the fimbriæ, of direct application around the latter (Fig. 1).

The oviduct being, developmentally, a mere prolongation of the uterus toward the ovary, has the same structure, viz., a firm wall of non-striated muscular fibre, invested externally by peritonæum, and lined within by a mucous membrane. The latter presents longitudinal folds more marked in its outer portion, and has a columnar ciliated epithelium, which covers the outer as well as the inner surface of the fimbriæ.[1]

M. Rouget, in 1858,[2] demonstrated the muscular element in the round, the ovarian, and the utero-sacral ligaments, and in the serous ligament which unites one of the fimbriæ with the ovary. He also discovered delicate muscular fibres between the folds of the broad ligament, and especially in the course of the vessels of the ovary, and which he calls the ovario-lumbar ligament; and has shown that there is a double radiation of muscular fibres across the ovary, proceeding from the round ligament, and the ovario-lumbar ligament in the membrane connecting the oviduct with the ovary. It is the contraction of these fibres, he maintains, which brings the pavilion into contact with the ovary. The vessels of the bulb of the ovary and the pampiniform plexus are also everywhere interlaced and enveloped by muscular fibres proceeding from both the ovarian and the ovario-lumbar ligaments, which, contracting under excitation originating probably in the ovum, both cause the application of the pavilion to the ovary, and produce the hæmorrhage of menstruation.

The views of Rouget need confirmation.

The oviducts are developed in continuity with the uterus and the vagina, and like them also, from Müller's canals. The remains of these ducts are shown at 12 (Fig. 1). The scope of this work does not demand more on this topic than the statement that the pavilion opens (the tube previously terminated in a *cul-de-sac*) in the fourth month, and the fimbriæ some time afterward; and that the flexuosities are first perceived in the fifth month, and at the eighth, and for some years after birth are more decided than in the adult.

Finally, attention is called to the non-striated muscular fibres between the folds of the broad ligament, and the loose connective tissue which maintains the different parts, and organs already described, in their relations to each other, and which sometimes becomes the seat of cystic development, as will be seen.

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[1] Gray's Anatomy.

[2] "Recherches sur les Organs erectiles de la Femme," etc., "Brown-Séquard's Journal de la Physiologie," tome i., 1858.

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CHAPTER II.

OVARIAN TUMORS—THEIR CLASSIFICATION AND PATHOLOGICAL ANATOMY.

SECTION I.

SOLID OVARIAN TUMORS.

The ovary is liable to many pathological conditions; of which the different varieties of tumors alone are to be considered in this work.

Classification of Ovarian Tumors.—Ovarian tumors may be arranged under two general heads—the solid and the cystic. There is, of course, no such thing as a fluid tumor; the tumors thus named being cysts with fluid contents. By mixed or compound tumors are meant those consisting of cysts, together with a solid portion. These, however, present no peculiar anatomical elements, and require no extended notice here. Their cysts are, moreover, a secondary development from *ramollissement* of the solid portion, e. g., a cystic sarcoma is merely a development of cysts in a fibroid tumor, and will be again mentioned under that head. Cystic carcinoma is another similar instance; and colloid degeneration, sometimes included among the mixed tumors, will be found to be an element of several of the tumors to be described.

The following are the varieties of solid ovarian tumors:

I. Enchondroma.
II. Osteoma (Ossification).
III. Carcinoma.
IV. Papilloma.
V. Fibroma, { Of the Corpora Lutea.
  Of the Stroma.

I. Of **Enchondroma** and Ossification but little need be said. But two cases of the former are on record, both reported by

Kiwisch, and both doubtful. Scanzoni saw one of them, and considered it an ovarian fibroid, with a new formation of cartilage; and Klob was not satisfied respecting the other, but suggests that this also was a case of that kind, as sometimes occurs in ovarian cysts.

II. **Ossification,** on the other hand, is not very uncommon in ovarian fibroids (Rokitansky). Bone is, however, like cartilage, always a new formation in a preëxisting tumor.

III. **Carcinoma** of the ovary is very rare, though up to the present time there has been too strong a tendency among pathological anatomists to admit its frequency. Dr. Bright regarded most of his reported cases of ovarian tumors[1] as being malignant. At the present time, also, much is said of the alveolar cancer of the ovary; which, for me, is not cancer at all. The so-called tumor will be described in the next class. The colloid matter it contains will be found to be common in cysts certainly not malignant.

Cancer is said usually to affect both ovaries at the same time; and it is added that the encephaloid variety is more common than the scirrhous. It is my opinion, after observations extending over twenty-five years, that medullary cancer of the ovary is more rare than scirrhous; many of the cases thus reported being simply the benign papillomatous or dendritic form of tumor, hereafter to be described. I also think a single ovary to be more frequently affected by scirrhus than both.

Scirrhus of the ovary at first presents the same hard, nodulated surface as elsewhere, but it not seldom has a secondary development of encephaloid on its surface. It rarely attains to a size larger than an orange, and is generally associated with ascites. The latter is, indeed, always to be considered as suggestive of scirrhus of the ovary, if an ovarian tumor of but small dimensions is known to coexist with the ascitic accumulation.

Cancer of both forms not very seldom commences in a neighboring part, and extends to the ovaries. It may also occur secondarily, in a larger ovarian tumor. I have met with two instances of this kind. It may also contain pigment-cells. But the rarity of this disease, as commencing in the ovary, may be inferred from the fact that T. Spencer Wells mentions but three cases[1] in his first four hundred cases of ovariotomy, and Dr. Charles Clay has found but six instances of undoubted carcinoma in five thousand cases diagnosticated by him. I have myself seen but two cases of demonstrated and two of strongly-suspected cancer commencing in the ovary, in over two hundred cases of autopsies and ovariotomies, in which I have been concerned as principal or otherwise. We must, therefore, regard the following statement of Kiwisch, and which has doubtless had much influence upon gynæcologists, as an exaggerated one:

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[1] "On Abdominal Tumors." New Sydenham Society, edition 1860.—Madame Boivin also considered all large tumors of the ovary to be malignant; and Dr. Seymour seems to have been of the same opinion.—(T. S. Lee, p. 227.)

> Cancer of the ovaries, with the exception of childhood, spares no period of life, and it is not rare in the prime of life; but medullary cancer occurs in young persons exclusively, particularly with alveolar softening of the tissue. The fibrous cancer, on the other hand, belongs chiefly to the advanced periods of life. We have besides to observe that ovarian cancer breaks out much earlier than uterine; for, while, in a great number of uterine cancers, we have as yet seen none developed before the age of twenty-four years, we have observed very extensive ovarian cancer in a girl of seventeen. However, the frequency of ovarian cancer, compared with the uterine, if we except the secondary forms which proceed from the latter affection, is not so considerable; and, according to our observations, we may assume that, for every five cases of primitive uterine cancer, there occurs one case of primitive ovarian cancer. But, among the solid tumors, cancer and adipose cysts are the most frequently-occurring forms of disease.—*Diseases of the Ovaries*, p. 243.

The statement of T. Safford Lee, also, that he had seen a scirrhous ovary, discovered by the patient soon after labor, rise in seven weeks to the umbilicus, from the size of a fist, must be received with some doubt as to the correctness of his diagnosis (p. 228). I believe, with Fehr,[2] that carcinoma of the ovary is the least common of all its diseases. It, however, sometimes attains to a large size. Lebert mentions a carcinomatous ovary weighing eleven pounds; and I have seen a case in consultation with Dr. J. L. Brown, of this city, in which the tumor weighed nineteen pounds.

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[1] Cases 61, 62, and 82—all in his first 114 cases. The first would not, I think, now, be termed cancer at all. The other two patients died of cancer several months after the operation, but there is no proof that the ovary was the starting-point of the disease.

[2] "Die Ovariotomie, geschichtlich und kritisch bearbeitet," Heidelberg, 1864, p. 44.

Rindfleisch,[1] who maintains that the medullary cancer is the most common, though rare, in the ovary, thinks that it may originate in the ovisacs or in the tissue between them, though further proofs are wanting. He adduces the regularly areolar formation of the round nodes of which the tumor consists, as a proof of the first-mentioned origin. The marginal portion of such a tumor, of the size of a hen's-egg, is represented by Fig. 17. The vessels are filled by a blue mass, and the nodule touches the tunica albuginea, which is covered by a number of papillary excrescences. Its section resembles that of a tubular gland, e. g., the cortical substance of the kidney. All the branchings of the cancerous stroma are vascular, and carry the cancerous cells, like a low cylinder epithelium, leaving between their transverse sections open spaces resembling vascular canals. The tunica albuginea is not itself infiltrated with carcinomatous deposit, but forms a very firm partition between the nodes on one side and the papillæ on the other. One of these papillæ shows in its somewhat swollen body a plainly visible beginning of new cancerous formation. Parallel with, but not very close

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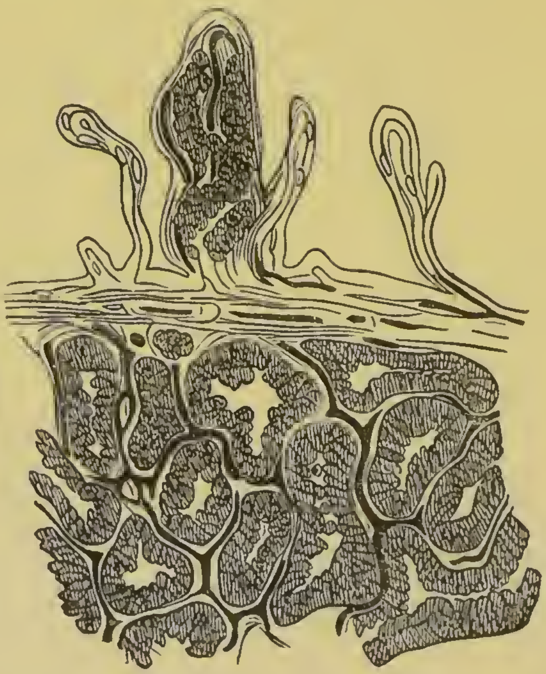

FIG. 17.—Glandular Carcinoma of the Ovary.

The peritoneal covering, thickened and surmounted by papillæ, shows in one of these papillæ a commencing carcinosis. Magnified three hundred diameters.—(Rindfleisch.)

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[1] "Lehrbuch der pathologischen Gewebelehre." Von Dr. Eduard Rindfleisch. Leipzig, 1866.

to its vessels, there are longitudinal fissures filled with the same large epithelial cells which we recognize as cancer-cells in the nodes below. Rindfleisch thinks that the lymphatics are here, as in the formation of tubercle, the starting-point in the development of the disease, their endothelium growing profusely into cancer-cells. A sprouting out of an already-existing epithelium, possibly of the ovisacs, is out of the question, since the tunica albuginea separates the papillæ from the ovarian node. If, therefore, the ovarian carcinoma belongs to the glandular form, it is at least able also to extend itself into the connective tissue and its cavities, after having grown beyond the glandular organ first affected (p. 452). But the researches of Waldeyer, respecting the epithelium of the ovary, showing that it is of the same nature and origin as that of the ovisacs, lead us to conclude that the cancer-cell may be originally or secondarily developed in it as well as in them.

In regard to colloid cancer of the ovary, it should be said that no amount or variety of consistency of colloid contents of an ovarian cyst demonstrates its malignant character; and the expression should be dropped. Colloid throughout this, as in recent German works, merely means a gelatinous substance.

True acephalocysts (hydatids) of the ovary have not yet been anatomically demonstrated (Boinet, p. 111).

IV. **Papillary Tumors** (papilloma) of the ovary are also exceedingly rare. They rise from a corpus luteum (p. 11), and correspond to its mass, being of about the size of a pea, and consisting of vascular, villous, reddish-yellow proliferations.

Rokitansky also describes a dendritic form of papilloma of the corpus luteum, consisting of various lentil-shaped, flat, white, fibrous little bodies, depending from a ramifying pedicle. In 1862, Klob found a similar tumor as large as a pea in the upper border of the right ovary of an old woman. Both ovaries were scarred, and rather small, and the uterus showed that she had borne children. But there was no trace of a corpus luteum at the base of the tumor, as there was not in Rokitansky's case; and Klob doubted if either had any connection with ovulation.

V. **Fibroma** of the ovary presents two varieties:

a. Fibroma of a corpus luteum.
b. Fibroma of the stroma of the ovary.

a. Fibrous tumors, originating in a *corpus luteum*, possess a good deal of interest, they being, unlike the following variety, enclosed in a dense capsule corresponding with the previous limits of the corpus luteum. The smallest tumors have a puckered envelope. They sometimes have a central cavity filled with serum. Only three cases of this form of ovarian fibroid have been recorded; two by Rokitansky, and one by Klob:[1]

Case I. (Rokitansky.)—Patient aged forty-five; in left ovary a mass large as a walnut, tuberous, elastic, dense, oblong, and in a distinct membranous envelope. A trans-section showed a puckered rind one to one and a half line thick, and of a reddish-white color. Within was a dense white, fibrous, radiated, connective tissue. There was an osteoma, of the size of a pea, in a portion of the rind.

Case II. (Rokitansky.)—Patient aged forty-three; in the right ovary there was a tuberous mass much larger than a walnut. Trans-section showed a thick whitish stratum, connected externally with the remains of the ovary, which seemed transformed into a membrane. Within this was a fibrous, white, and, in some parts, rose-colored mass, enclosing two distinct cavities, containing clear serum.

Case III. (Klob.)—Patient aged fifty-eight; there was a tumor of the left ovary, as large as a child's head, depending from the posterior lamina of the broad ligament by a pedicle one inch long, and twisted one and a half time round, it being also adherent to the omentum majus and the pelvic peritonæum. (I shall refer to it on a subsequent page, as being a fibroid of the ovarian stroma.) But this mass, on trans-section, contained a white body (corpus albidum) of the size of a pea, surrounded by a loose capsule, being also itself loose but tenacious in consistency. Its peripheric layers only present a yellowish tissue, nowhere more than a quarter of an inch thick, traversed here and there by whitish lines, and forming by its distinct limitation a sort of rind-substance. This layer feels fatty, but is, on the whole, rather tenacious. The microscope reveals firm fibrillar connective tissue and an abundance of its corpuscles undergoing fatty degeneration. The inner portion of the tumor is fibrous, tenacious, uniformly pale red, and consists of older and younger connective tissue. There is no trace of cancerous elements.

b. A fibroma of the stroma of the ovary is histologically simply a diffuse proliferation of the connective tissue of that organ. This ensues most frequently as a consequence of oöphoritis, and both ovaries are generally affected by it, if thus produced, but remain of small size.

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[1] "Pathological Anatomy of the Female Sexual Organs." By J. M. Klob, M. D. Translated by J. Kammerer, M. D. New York, 1868.

Fibroids of the ovarian stroma are very rare, and not often exceed the size of a goose's-egg. They are very dense, firm, and lobular, and no elements of the ovisacs, not even their cicatrices, appear in them. Rindfleisch alludes to the ovarian fibroma as a variety of "histoid" tumor, but does not give any other example. They differ from uterine fibroids in the predominance of firm connective tissue, and the absence of muscular fibre; the latter having been but once met with—by Sangali (Virchow, vol. iii., p. 227). This observation of Sangali may be explained by reference to Rouget's discovery of muscular fibres crossing the ovary, which has already been specified. Virchow states that they contain no muscular fibres, or but very few. Besides, they cannot, like uterine fibroids, be enucleated. Generally, they affect but one ovary; or, if both, not equally. Foerster records a case in which one ovary was as large as a swan's-egg, and the other three or four times that diameter. It has been stated that, if both ovaries be symmetrically affected by tumors, the disease is generally carcinoma. In one of Scanzoni's cases the fibroma consisted of several portions crowded together. T. Safford Lee, however, mentions a case of fibroma of both ovaries in King's College Museum (No. 4), each ovary being as large as a cocoa-nut (p. 225). Mr. Spencer Wells[1] presented to the London Pathological Society a fibrous tumor of the ovary the size of a large cocoa-nut, so hard that it could be divided only by the saw. Its denser parts were calcified by a deposit of carbonate of lime. Waldeyer[2] describes a diffuse ovarian fibroid somewhat similar to the above. It was about six by four and a half inches in size, and weighed a little over two pounds. It was so hard that it was difficult to make a section, and resembled osteoid tumor of the upper jaw.

The rarity of fibroma of the ovarian stroma is shown by the fact that Kiwisch notes but two cases (p. 223), and Scanzoni but four. Klob reports one case. I have myself seen two cases; one of them removed by Prof. Thomas, at the Bellevue Hospital, in September, 1864. Dr. Van Buren also removed two such tumors in 1849 and 1850.[3] Kiwisch's cases, and the two last-mentioned, varied from the size of the fœtal to that of the adult head.

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[1] "Trans. Lond. Path. Soc.," vol. x., p. 199. [2] *Arch. für Gynaekol.*, ii., 3, 1871.

[3] Reported in *New York Journal of Medicine*, March, 1850; and March, 1852, vol. viii., p. 212.

It should here be stated that adenoma[1] of the ovary has more recently been asserted. But, since this term is rightly applied only to an hypertrophic development of the epithelial element of a gland, the subject needs further investigation.

The question has arisen, whether the ovarian fibroid ever attains to a size so great as to produce symptoms demanding its removal by the operation of ovariotomy. Virchow thinks that all the well-authenticated cases vary in size from a hen's-egg to a child's head; and that all the larger solid tumors he has seen were fibro-cystoma, hard carcinoma, or a mixture of myoma and carcinoma.

On the other hand, the larger ovary in Foerster's case, just alluded to, was of the size of a man's head. So was the largest of Scanzoni's four cases; its tissue being loose, vascular, and in some parts presenting a "cavernous disposition" of the veins. Dr. Thomas's case was the fac-simile of the last-mentioned. In Dr. Van Buren's cases the tumor was as large as the adult head. Cruveilhier, however, claims to have found an ovarian fibroid weighing forty-six pounds, and Simpson one of fifty-six pounds (T. S. Lee, p. 224). As secondary cysts are not seldom developed in this form of fibroma, we may believe that these were instances of fibro-cystoma, and not of simple fibroma of the ovary. Dr. A. Clark, of this city, detected the commencement of secondary cysts in Dr. Van Buren's first case; and Virchow states that cysts may be formed within them, containing a clear fluid, or a pulpy or a bloody coagulated mass, as seen in Fig. 18. The ovarian fibroma is also liable to ossification as a secondary change.

There need, therefore, be no further doubt whether an ovarian fibroma may not produce symptoms demanding the operation of ovariotomy from its size merely; and whether, in its primary condition, or after assuming the form of a fibro-cystoma.[2] And in this view it becomes relatively of very high practical importance, since no other solid tumor of the ovary is of sufficient size to be placed in this category—a very few cases of carcinoma, possibly, excepted. These two forms only of solid tumor of the ovary will, therefore, be recognized in the subsequent chapters of this work.

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[1] See description of such a tumor in vol. vi. of the "Obstetrical Transactions," pp. 181–3.

[2] The term cystic sarcoma is not a sufficiently distinctive term, and should be dropped.

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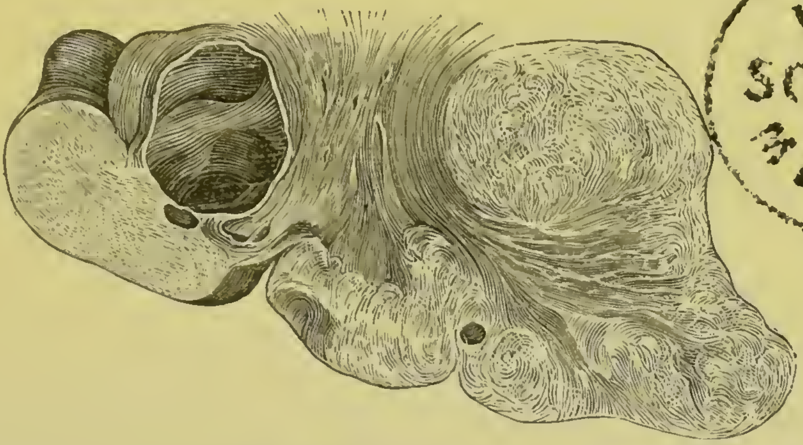

FIG. 18.—Lobular Fibro-cystoma of the Left Ovary of a Married Woman, Thirty-eight Years old, and very fat.

Vertical section.—The change affects the entire ovary; only the region of the hilus and a portion of the stroma are still preserved. Thence the fibrous layers pass continuously into the periphera, portions of the tumor, forming several nodules, which originated independently of each other and which consist of a felt- or tendon-like tissue. Muscular fibres are not plainly perceived; even the connective-tissue elements are very sparse and fine, and changed almost completely into elastic fibres. Microscopically, the tissue resembles exactly that of the semilunar cartilages of the knee. On several places, especially at the uterine termination, cysts with smooth walls, but of irregular shape, are found; none, however, in the indurated portions. The whole swelling measures three and three-quarter inches (seven cm.) in length, one inch (two to three cm.) in height, and three quarters of an inch (two cm.) in breadth. Specimen No. 102 of the year 1863. There also existed indurative hyperplasia of the uterus with the formation of myoma in the fundus, acne of the vaginal portion, and cyst formation in the neck; in the fundus of the vagina a fibro-myoma of the size of a hazel-nut. Perimetritical adhesions. The right ovary somewhat enlarged, with a callous capsule and the corpora fibrosa but slightly developed.—(Virchow.)

While, however, the greater magnitude of the ovarian fibroma, and fibro-cystoma, is admitted as actually occurring, it must also be stated that, in a considerable proportion of the cases more recently reported, of the removal by ovariotomy of large fibroids and fibro-cysts of the ovary, a uterine fibro-cystoma, and not an ovarian, has actually been removed. The tumor may have extended to the ovary, and perhaps involved it, so as to mislead any one but an expert. The number of such reported cases will diminish in proportion as such mistakes are corrected, by a proper examination of the mass removed.

Finally, ovarian fibroids of the stroma may sometimes produce very serious effects independently of their size, and thus also demand the operation of ovariotomy. In one of Kiwisch's cases the tumor became partially gangrenous and produced the death of the patient. They sometimes become necrosed by pressure during labor; and may then lead to the formation of fistulous passages into the vagina, or rectum, for the discharge of the ichorous fluid from the pelvis (Rokitansky). Klob's case of fibroma of the corpus luteum (p. 24) occurred in an ovarian fibroid of the size of a child's head, whose pedicle was twisted once and a half round; this producing extreme congestion, and consequent softness of the tumor. In Dr. Van Buren's first case the pedicle was twisted to precisely the same extent, and was also livid with congestion. Necrosis of the whole mass must very soon have occurred. I shall again refer to his two cases.

SECTION II.

CYSTIC TUMORS OF THE OVARY.—(OVARIAN CYSTS.)

Cysts are more frequently developed in the ovary than in any other organ,[1] the kidney perhaps excepted, and their larger forms were formerly included in the term "ovarian dropsy," or "hydro-ovarium." Rindfleisch remarks that this organ has in its ovisacs a preformed disposition to cysts; since, if the mature ovisac does not burst, as before explained (p. 10), it becomes a cyst at once, to be referred to some one of the following varieties. All ovarian cysts, however, are not developed from ovisacs, as will be seen farther on.

Of cystic tumors of the ovary there are three classes, including five varieties:

- I. Hydrops Folliculorum,
- II. Cystoma Ovarii,
  - Struma,
  - Oligocysts,
  - Polycysts.
- III. Dermoid Cysts.

All other cysts of the ovary are of secondary formation; i. e., cysts occurring in a solid ovarian tumor from softening or otherwise. The fibro-cystoma has already been mentioned (p. 26), as an instance.

I. **Hydrops Vesicularum (Folliculorum[2]).**—This is the simplest form of ovarian cysts, and the least important; since they seldom attain such a size as to render them recognizable during life, and do not require any surgical interference. They are, however, far more frequently found in *post-mortem* examinations than any other form of ovarian cyst.

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[1] The lower animals, also, especially birds, and of them, above all, the domestic fowls, are liable to ovarian dropsy (Seymour, p. 4, note). The cow is also sometimes found affected by this disease.

[2] This word is objectionable; since the ovisacs are not follicles, but vesicles.

Often not larger than a cherry, they are sometimes of the size of the fist, or even of a child's head. They occur in children, even in the new-born, and in adults, and single or plural in both. They have smooth, thin, almost non-vascular walls, and contain a clear, serous fluid, resembling blood-serum.

The preceding facts suggest the idea that this form of cyst is merely an ovisac over-distended by its normal contents abnormally increased in quantity. In the adult female, any ovisac containing a ripe ovum would thus become a cyst, if its rupture was by any agency prevented.

Rokitansky has demonstrated the origin of the cysts under consideration, by finding the ova, though in but a single instance in which the cysts were no larger than a cherry. That they occur in the new-born, also, is not surprising, since it has been seen (p. 8) that imperfectly-developed ovisacs exist in immense numbers at birth, though the ova are still incomplete, and therefore cannot be found even in small cysts. But, even as they occur in the adult, it is not to be expected that so delicate a structure as the ovum would long be preserved, or, if so, could be found in a large amount of fluid. Hence ova have been found in the adult only in cases of very small cysts.

A distinction has been attempted between hydrops folliculi and hydrops ovarii, which is, however, of no practical importance. Rindfleisch remarks that the usual hydrops ovarii belongs to another category, since here neoplasms occur belonging to an entirely different method of development; for it results in an ovisac containing the usual cell-mass of the membrana granulosa and the ovum, from an accumulation of a larger quantity of albuminous fluid, and which is here from the beginning serous, and not mucous. The ovum afterward perishes, and its disintegration can be plainly seen. First the outer portion, the protoplasm-mass, is dissolved into a softer substance, which is easily crushed, and finally entirely liquefies. Then nothing remains but a simple serous sac (p. 446).

Thus hydrops ovarii, if the distinction be retained, is primarily a mere hydrops vesicularum, and only serves to distinguish the case where the cysts are more numerous and of a larger size, and the ovary is thus, to a greater extent, invaded by the disease. The largest cysts may, however, be formed by the fusion of smaller ones, as sometimes occurs with the form of cyst next to be described; and in such cases the term dropsy of the ovary is even more appropriate, though still objectionable, since other cysts equally deserve this designation. It will not again recur in this work.

Hydrops vesiculæ is not seldom found in pregnant and puerperal women; a larger number of ovisacs becoming dropsical, whence the ova can be obtained on opening the cysts and carefully examining their fluid. This affection usually coexists with intense catarrh of the sexual organs, or metrorrhœa; and it might justly be termed a catarrh of the ovisacs.

II. **Cystoma Ovarii.**—Under this head[1] are included those cysts of the ovary which are to the physician and the surgeon of the highest importance, since they alone, with a few exceptions of the dermoid cyst, and still fewer of the ovarian fibroma (p. 26), demand the interference of the latter. Of one hundred tumors removed by ovariotomy, at least ninety-seven will be found to belong to the two forms of cystoma next to be considered. They also surpass in magnitude all other pathological formations. To these, therefore, and the dermoid cyst, the remainder of this work will be almost exclusively devoted.

Rindfleisch defines cystoma ovarii to be a cystic degeneration of the ovary—one, or several, or many cysts substituting the organ. Whether, however, the mass consists of one or of several cysts, he thinks of no importance to the pathological anatomist, since it is proved that all ovarian cystomata contain several or many cysts at the beginning, and, of these, several cysts become melted into one.

Practically, however, it is a question of much interest whether a single cyst, or a very few, or very many cysts, exist in a given case; and whether there are different varieties of ovarian cystoma, which manifest original differences in the tendency to become monocystic or to remain polycystic; and it is upon such an original difference that the distinction has been made of the monocystically inclined and the polycystic, or the unilocular and the multilocular cystoma. There are, however, other not less important characteristics of these two classes. The monocystically inclined cystoma has an entirely different origin from the polycystic, and is far less likely to become adherent to parts and organs in contact with it. It is also slower in its development, and less rapidly impairs the patient's general health. Its fluid contents are also more bland and unirritating, and its walls are less liable to inflammation and ulceration.

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[1] From κύστις, a bladder or cyst.

There is, therefore, sufficient ground for separating the larger cystic tumors into two classes. But the occurrence of a tumor originally monocystic is extremely rare, and incapable of demonstration; and certainly, in most cases, the monocyst is derived from the first form of cystoma, whose other characteristics have just been specified, and which also consists of a limited number of cysts throughout its existence—while the second form continues to develop new cysts indefinitely. I have therefore adopted the term oligocystic[1] cystoma as more distinctive than monocystic, and considered the latter as an accidental modification of the former.

The macroscopic character of these two forms of cystoma depends on the number and size of their constituent cysts. A single cyst is globular; two or four cysts give an oblong form with semiglobular projections.

The fluid in the cyst shines through the walls, and is yellowish, or of various shades of brown; and an opening into a single one may be found to evacuate several others communicating with it. These contents interest the chemist and the surgeon more than the anatomist; the principal element being a still enigmatic albuminous substance, which has of late been generally—and especially by German chemists—termed *colloid;* and which presents many modifications. Eichwald has shown that two distinct forms of chemical metamorphosis occur independently of each other in ovarian cystoids; the one producing mucus-peptone, which is formed from the colloid derived from a metamorphosis of the tissues, and the other albumen-peptone, derived from the albuminous substances transuded from the blood. The constant action of the temperature of the body produces a sort of slow digestion of these crude substances; and the longer the change has gone on—i. e., in the largest cysts—the fluid is less dense and viscid, as they contain the soluble albumen; while the smaller still retain the mucus-peptone, and have dense colloid contents.

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[1] Or, paucilocular, in opposition to polycystic; ὀλίγος, few, and κύστις; few-cysted.

The solid substances frequently found floating in this fluid are free cells and nuclei, crystals of cholesterine, fat-globules and granules, blood-corpuscles, and pigment. They are derived mostly from stearosis of the epithelial lining of the cyst, and from hæmorrhage from its wall.

Struma Ovarii.—There is another form of cystoma ovarii, admitted by Rindfleisch, but denied by Rokitansky, which should be mentioned here—*struma ovarii.* Rindfleisch describes the only specimen he had at his disposal, as follows: It is a very rare form of cysto-colloid[1] degeneration, affecting both ovaries equally. They surpass, in size, a man's fist, are smooth on their surface, and through the envelope may be seen a large number of cysts, from the size of a millet-seed to that of a pea, which lie side by side, like mosaic. On section, this mosaic of cysts is seen extending through the entire thickness of the organ; the largest specimens, perhaps as large as a cherry, being found in the central portions. The whole presents a honey-comb appearance. The contents of the cysts are a transparent colloid substance (gelatine); so that this, as well as the two forms just mentioned, might be termed colloid tumor of the ovary.

The extreme rarity of this form of cystoma explains why nothing certain is known as to the origin of the cysts. Prof. Rindfleisch's specimen had been so changed by the action of alcohol, that no reliable investigation was possible. The macroscopic appearances, however, suggest an origin from ovisacs. The smallest cysts were no smaller than the average of well-formed ovisacs; each cyst had its own firm membrane; and the arrangement of the larger and the smaller cysts reminds one of the similar arrangement of the ovisacs. Rindfleisch, therefore, considers this form of cystoma to be struma of the ovary according to Virchow's definition of struma (p. 453).

Since the two preceding forms of cyst, hydrops folliculi and struma ovarii, are of no special importance, they are dismissed here. And before particularly describing the three forms of cystic tumor to which the remainder of this work will be devoted—viz., the oligocyst, the polycyst, and the dermoid cyst—some account will be given of the

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[1] Colloid simply means gelatinous; it does not imply malignancy.

General Structure and Contents of Ovarian Cysts.—In size, ovarian cysts may vary from the smallest dimensions up to a capacity of even ten gallons, or more. They have been found with a circumference of four feet. T. S. Lee refers to a single cyst, placed by John Hunter in the Museum of the Royal College of Surgeons, which measures four feet in circumference in one direction and three feet in another. Generally but a single ovary is affected; but, if both are so, they will not be found at the same stage. It is doubtful if either ovary is more liable to cystic disease than the other. Oligocystic tumors (and monocysts) have rounded or oval surfaces, and on the whole a spherical form, sometimes with slight indentations. Polycysts are lobulated, not spherical generally, and have deep depressions corresponding to internal dissepiments. The walls of the former are smooth, opaline, and transparent; of the latter, rugous, opaque, and often strangulated. But we have here especially to consider: *a.* The structure of the walls of ovarian cysts; *b.* Their contents.

a. The walls of ovarian cysts present three distinct layers:

1. Peritonæum;
2. The Middle or Proper Layer;
3. An Epithelium.

1. **The Peritoneal Layer** of an ovarian cyst is of greater or less extent, according to the precise manner in which the cyst is developed. There being naturally no peritoneal covering of the ovary itself, but an epithelium only, beyond the marginal line, as has been described (p. 5), it might be inferred that an ovarian cyst, however large, would also be destitute of this covering at every point. If, however, the development of the cyst is at first rather between the layers of the broad ligament, than backward in the direction of the free surface of the ovary, it becomes, and afterward continues to be, almost completely invested by the peritonæum. There will always, however, be a portion of the cyst, and generally the upper and anterior por-

tion, which has no peritoneal covering; and, in the case of development backward at first, this investment may cover only the lower half or third of the tumor. This condition is far more common in oligocysts than in polycysts, and the absence of peritonæum is indicated by a less degree of vascularity and greater whiteness of the external surface than in other parts. Sometimes, however, a few vessels are seen converging from the margin of the surrounding peritoneal layer and anastomosing on the originally merely epithelial surface of the ovary. A point in this less vascular surface is of course to be selected by the ovariotomist for the operation of tapping preliminary to a removal of the cyst through the abdominal incision.

The more or less extensive peritoneal layer of the cyst is usually quite vascular and easily separable from the middle layer, especially toward the pedicle of the cyst. But in some cases it acquires a surprising thickness and vascularity, and is very loosely attached to the subjacent layer. I have seen numerous veins in it not less than one-quarter of an inch in diameter; and if these are seen through the incision made by the ovariotomist, and also extend above it beyond his view, he may well doubt, especially if this layer can also be made to slide easily over the mass of the cyst beneath it, whether he has before him the outer covering of an ovarian cyst, or perhaps that of a large malignant tumor of the kidney. In a case of this kind, which occurred to myself in October, 1870, I could not decide till I extended the incision upward and traced the thickened peritoneal investment to its termination in a small circular surface near the upper extremity of the tumor. I also saw a similar enlargement of vessels and looseness of attachment of the peritoneal layer in a case operated on by Prof. Thomas, in January, 1871.

The peritoneal layer may by inflammation become very much thickened, even to one-half an inch or more; and the peritonitis, extending to contiguous organs, may produce adhesions. But not all adhesions are to be regarded as inflammatory. Sometimes, also, ascites, coexisting with an ovarian cyst, is due to peritonitis extending from the latter.

The cyst is covered by epithelium only at its upper portion, and wherever the peritoneal covering is wanting.

2. **The Middle Layer** of an ovarian cyst is the expanded and hypertrophied original tunica albuginea of that organ (p. 3). Its vascularity and thickness vary much in the different forms of cyst, it being less vascular and thicker in oligocysts. This layer also is liable to great changes in these respects from inflammation, and which may commence either in this or the peritoneal layer of the cyst. Its greatest thickness and density are usually at the site of the vascular supply, i. e., at the original site of the ovary; and it is there in some cases from one to one and a half inch thick. The ulterior effects of this inflammation will be specified in another section.

3. **The Epithelial Lining** (endothelium) of ovarian cysts consists of a single layer of cells in the smaller cysts, and of several in the larger and largest.[1] By them the normal contents of the cysts are secreted, in the case of oligocysts and polycysts; in the case of dermoid cysts, the more common contents are produced by the true skin, which constitutes a part or the whole of their internal surface. The cystic epithelium is liable to undergo fatty degeneration. Boinet asserts (p. 80) that it does not always exist, and may never have been developed. M. Ordoñez asserts that the epithelial layer does exist continuously over the whole internal surface, and is usually of the pavement form. In small cysts he has also found ciliated cells, not forming a layer, but grouped, from three to six together, among the pavement epithelial cells. The epithelium is not easily recognized in cysts not larger than a filbert.

The internal surface of oligocysts much resembles the pericardium. It changes much, however, according to the character of the fluid in contact with it. If the latter be purulent, it becomes fungous, tomentose, reddish; if sanguineous, adherent clots of fibrine, or false membrane of varying thickness, and sometimes forming stratified layers, are occasionally met with.

The vessels distributed to ovarian cysts are of course those originally distributed to the ovary. The veins, placed between the two outer layers, are sometimes of great volume, even as large as the little finger.[2] The arteries are less important, except as forming a part of the pedicle. Large lymphatics are also sometimes found in the latter.

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[1] This, in the oligocyst, is the over-developed membrana granulosa of the ovisac.

[2] T. S. Lee, p. 13.

The Fallopian tube of the affected side is stretched over the distended cyst, and thus becomes very conspicuous; it always conducting to the portion of the ovary which (if there be any such portion) remains unchanged. Generally, the ovary disappears entirely; but it sometimes becomes hypertrophied and indurated. The broad ligaments of the uterus are lengthened, and the uterus is sometimes elevated, but generally the reverse. The minute structure of the walls of each variety of ovarian cyst will be specified under the appropriate heads.

b. *The contents of ovarian cysts* always consist of a fluid, in which are solids of various kinds.

1. The **Fluid** presents almost every shade of density from a specific gravity of 1007—though seldom below 1015—to a dense jelly, which will not flow through a canula of the largest size. It is denser in the small than in the larger cysts of the same tumor; and, as already explained, richer in albumen in the latter, and in gelatine in the former. The fluid of a monocyst, not before tapped, is less dense than that of a polycyst. But after tapping it usually becomes more highly albuminous than before. It is in polycysts alone that the firm jelly is met with.

The **Color** of the fluid presents many varieties. The monocyst, before tapping, usually contains a clear, transparent fluid, not unlike ascitic fluid, but not so straw-colored; but, after tapping, it becomes darker, and more viscid, sometimes even as dark as coffee-grounds, from the admixture of blood, proceeding from a punctured vessel, or as a result of congestion or inflammation of the cyst-walls. Sometimes, however, as in a case I saw with Prof. Markoe, the fluid is quite red, resembling bloody serum, though the patient had not been before tapped. That case finally proved to be one of carcinoma of the right ovary.

Pus may also abound in the fluid as well as blood.

The darker color above mentioned is very common in polycysts before tapping; and the same tumor may present very many varieties of color in its different cysts—the straw-color, the green, the yellow, and dark brown, predominating. Mr. I. B. Brown remarks, that he has evacuated cysts containing a black, ink-like fluid, a gruel- or custard-like one, and a mixture of fluid with a solid, brain-like matter.[1] The gruel-like fluid, or rather a fluid resembling liquor amnii, is legitimate in dermoid cysts. The entire change of color occurring after tapping is doubtless sometimes due to the fact that fluid has entered from another sac which had also been punctured at the time of the tapping.

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[1] *Loc. cit.*, p. 14.

Hence the chemical constituents of the fluids of ovarian cysts, especially the gelatine and the albumen, are very variable in quantity. An analysis of four cases, by Dr. Owen Rees, is given in Dr. Bright's work on "Abdominal Tumors" (p. 93);[1] and the following (pp. 38, 39) is the analysis of the fluid in ten cases of ovarian cysts, by Becquerel.[2]

The **Quantity** of fluid contained in some monocysts is enormous. Forty and fifty pounds are so common as scarcely to deserve mention. Douglass reports a case of seventy-three pounds; Camper, of eighty pounds; and I have had a similar instance. I. B. Brown[3] had a case of ninety-three pints (probably about one hundred pounds). Dr. W. L. Atlee's case, No. 217, had one hundred and twenty-five pounds of fluid, by estimate.[4] W. E. L. Muller's patient, aged thirty-six, had one hundred and forty pounds of fluid in *both* ovaries.[5] In 1860 I obtained one hundred and forty-nine pounds and a fraction by tapping a monocyst, the patient being twenty-two years of age. But the largest amount of fluid in an ovarian tumor which has been recorded, I think, occurred to Dr. Kimball, of Lowell, who writes me that, during an operation of ovariotomy, he drew off one hundred and sixty pounds from a polycystic tumor, and still left more than twenty pounds, as he could not complete the operation.

The amount, indeed, of the secretion in monocysts, seems to be limited only by the pressure to which the sac is exposed as it increases in size. Hence, on being evacuated by tapping, it rapidly fills again. I. B. Brown's patient, referred to, accumulated ninety-three pints at first in four years; but, after tapping, secreted forty-nine pints in two months; and, after another tapping, fifty-two pints in a little over three months (p. 17). It is

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[1] "Guy's Hospital Reports," vol. iii., p. 204.

[2] Kiwisch, p. 108.

[3] "On Ovarian Dropsy." By I. Baker Brown, F. R. C. S. Lond., 1868.

[4] *American Journal of Medical Sciences*, April, 1871, p. 405.

[5] Todd and Bowman's "Cyclopædia of Anatomy," Supplement, p. 583.

ANALYSIS OF THE LIQUIDS OF OVARIAN CYSTS.

From L. A. Becquerel.

SOURCE.	Punctures.	Characters of the Liquids.	Density.	Water.	Solid Matters.	Pure Albumen.	Fibrine.	Fatty Matters.	Salts.	REMARKS.
1. Age, 36. Compound and voluminous cyst.	1	Ropy, viscid.	1027	941.6	58.40	49.35	....	0.06	8.5	.. ..
	2	Yellowish, gray, turbid.	1030	936.5	63.50	52.40	....	....	9.4	.. ..
2. Age. 35. Multilocular cyst of the ovary.	1	Turbid, very ropy.	Not ascertain'd	932.1	67.9	61.5	Traces.	2.1	5.8	.. ..
3. Age, 41. Unilocular ovarian cyst.	1	Transparent, clear.	1015	955.3	44.7	39.8	0.06	....	3.8	.. ..
4. Age, 22. Many cysts; one larger. One puncture.	1	Brownish, thick, ropy, viscid.	....	928.3	7.17	57.4	....	5.40	6.9	.. ..
5. This patient died. The three liquids were obtained from different cysts.	1st Cyst	Milky, slightly colored.	1007	978.5	21.5	17.4	Traces.	....	2.9	.. ..
	2d Cyst	Very pale, almost colorless, transparent.	1008	976.6	23.4	19.0	....	....	1.5	.. ..
	3d Cyst	Turbid, and sanguinolent.	1027	912.5	87.5	71.4	Traces.	4.3	5.2	.. ..
6. A young girl, aged 19 years. Nine punctures made during life; multilocular cyst. The punctures were made at three different points. The fluid collected after death was not analyzed.	1	Citron-yellow.	1031	909.3	90.7	81.6	0.052	....	7.8	.. ..
	2	Thick, viscid, reddish-colored.	....	914.4	85.6	...	...	....	..	Not sufficient for analysis.
	3	Brownish, very little liquid, ropy, milky, very viscid.	....	932.92	67.08	61.4	0.071	0.09	5.8	.. ..
	4	Very pale, somewhat milky, large in quantity.	1015	955.7	44.30	35.2	Traces.	0.5	8.6	An analysis was not made, on account of the similarity of the density and the physical characters.
	5	The same cyst, and similar contents.	1015	....	....	....	....	....	..	
	6	Viscid, sanguinolent, small in quantity.	1029	913.6	86.4	76.9	0.010	....	8.5	
	7	Very little, viscid.	....	936.6	63.4	....	....	....	..	Not sufficient for analysis.
	8	Opaque.	....	922.9	77.1	....	....	....	..	
	9		....	900.7	99.3	....	....	....	..	

7. Multilocular cyst. The liquid collected from four cysts after death.	1	Turbid, reddish, sanguinolent.	1030	....	88.6	77.4	....	0.02	6.9	..	..
	2	Clear citron-color, transparent.	1015	....	43.2	35.7	....	....	7.2	..	..
	3	Ropy, thick, viscid.	....	....	82.6	....	....	....	..	..	..
	4	Sanguinolent, thick, viscid.	1033	....	101.3	90.4	....	....	10.2	..	..
8. A young girl of 19 years of age. Unilocular cyst, with many of the cells incomplete. and blended with fibrous tumors. Five punctures were made. She died.	1	Liquid always thick and viscid, milky, similar in appearance in all the punctures.	1019	....	41.05	29.13	....	....	..	No examination was made for fibrine, fatty matters, or salts. A qualitative analysis made by me showed the presence of much fat. and a considerable quantity of cholesterine.	
	2		1018.8	959.20	40.80	28.	....	....	..		
	3		1018	959.35	40.65	24.80	....	....	..		
	4		1016.5	964.09	35.91	22.55	....	....	.		
	5		1016	965.50	34.50	21.45	....	....	..		
9. Unilocular cyst punctured.	1	Clear and transparent.	1026.38	946.732	53.268	43.130	....	....	..	No analysis for fibrine, fatty matters, and salts.	
10. Age, 34. Died in the hospital. A unilocular cyst punctured five times; toward the last complicated with ascites.	1	Always clear. but viscid, thick, ropy, and sticky.	1029.09	958.950	41.050	29.133	....	....	..	No researches for fibrine, fatty matters, and salts.	
	2		1028.985	959.200	40.800	28.605	....	....	..		
	3		1028.942	959.292	40.708	29.435	....	....	..		
	4		1028.235	964.025	35.975	24.315	....	....	..		
	5		1028.850	966.546	33.454	22.615	....	....	..		

The above table is taken from Dr. Clay's translation of Kiwisch. In the original there are several evident errors regarding the quantity of water. These errors have been easily eliminated by subtracting the amounts of the solid matters. In case 5 the sum of the separate ingredients of the solid parts does not correspond with the total. Dr. Clay remarks: "The preceding table, respecting the physical and chemical characters of the liquids contained in simple and compound cysts, is the most extensive hitherto published. M. Becquerel informs us that these results are extracted from an unedited work by Dr. Vernois and himself. Becquerel makes some comments on the table, from which the following facts are extracted: Unilocular cysts do not contain exclusively serous and albuminous fluids. When the cysts are numerous and non-communicating, the contents are sometimes similar, at other times very different. In the latter case one cyst may enclose clear, transparent, albuminous, and not very dense serum; another, a thick, ropy, viscid fluid, more or less brown in color. The contents of simple and proliferous cysts have the same composition, the difference consisting in the concentration of the solid parts. The reaction is alkaline or neutral, never acid. The clearest liquids possess a special viscidity, but this is not due to gelatine; it is owing to one of three circumstances: 1. A peculiar state of the albumen. 2. The presence of a large quantity of extractive matters. 3. The presence of fat, and especially cholesterine. Fibrine is often absent, and when present it is in very small quantity. The salts and fatty matters have presented great and singular varieties. Fatty matters are especially abundant in ropy and viscid liquids."

not uncommon to find a monocyst secreting an average of a pound a day for a month or more after tapping. Kiwisch mentions cases of twenty to forty pounds of fluid secreted in ten to thirty days (p. 153). I have reported a case in which, after three successive tappings, the secretion averaged two pounds daily; the intervals being thirty, forty, and fifty-three days, and the amount of fluid obtained being sixty, eighty, and one hundred and six pounds.[1] Kiwisch asserts that instances are known in which, in less time than a year, one hundred tappings have been undergone, and in which several thousand pounds of fluid were evacuated.

Thus the aggregate amount of fluid secreted by the same cyst in a course of years may be immense. Pagenstecker removed eleven hundred and thirty-two pounds by thirty-five tappings of the same cyst, besides losing much by allowing the canula to remain. I reported a case in 1849, with removal of two hundred and forty-eight and a half pounds of fluid at three tappings; and at the last about twenty pounds were also left in the cyst.[2] Dr. J. H. Griffin reports a case[3] of one hundred and eighty-six tappings, and seven hundred and fifty-one and three-quarter gallons of fluid of a clear straw-color, removed from November, 1830, to March, 1840. The patient was tapped from ten to twenty-six times yearly after 1832. There were two cysts at first, but both had disappeared for ten years at the time of the report.

Dr. Mead obtained nineteen hundred and twenty pints by sixty-six tappings in five and a half years (sixty-seven months).[4] Ford removed twenty-seven hundred and eighty-seven pints by forty-nine tappings. Heidrich took thirty-two hundred and eighty-nine Berlin quarts (ninety-eight hundred and sixty-seven pounds) by two hundred and ninety-nine tappings in eight years, the patient dying at forty-three. Mr. Martineau, of Norwich, Eng., removed from a patient (Sarah Whippius)[1] nearly five hundred pints in one year, and in twenty-five years, by eighty tappings, sixty-six hundred and thirty-one pints, which equals thirteen hogsheads of fluid. Berend mentions a case tapped six hundred and sixty-five times in thirteen years—once in seven days and a small fraction; and Sir Astley Cooper took twelve and a half gallons of fluid from a single cyst.[2]

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[1] *American Journal of Medical Sciences*, January, 1849, p. 49.

[2] Ibid., April, 1849, p. 374. See also other remarkable cases on p. 378.

[3] Ibid., April, 1850, p. 401.

[4] The name of Dr. Mead's patient was Mary Page; and the following inscription upon her tombstone, in Bunhill-fields burial-ground, perpetuates her memory:

"HERE LIES DAME MARY PAGE,
Relict of
SIR GREGORY PAGE, Bart.,
Who departed this life, March 21st, 1728, in the
56th year of her age."

On the opposite side of the tombstone is the following:

"In 67 months she was tapped 66 times: had taken away 240 gallons
of water, without ever repining at her case, or ever
fearing the operation."

T. S. LEE, p. 166.

These were doubtless cases (being monocysts) in which the secretion contained but a small amount of the organic elements, or exhaustion must have earlier occurred.

2. The **solid** contents of ovarian cysts include epithelial cells and fat-granules, and plates of cholesterine, as well as, sometimes, blood-corpuscles and pus-corpuscles and fibrinous flakes—in both forms of cystoma ovarii; and dense jelly also in polycysts. In cases of dermoid tumors, all these perhaps may be found, together with sebaceous masses, hairs, bones, and teeth. But these substances will be again specified in connection with a description of the particular forms of cyst in which they appear. The so-called ovarian corpuscle will also be considered in the chapter on diagnosis.

I next proceed to describe more particularly the two forms of cystoma which constitute most of the ovarian tumors we have to deal with practically, and which have been first distinguished rationally by Rindfleisch, on an histological basis.

THE OLIGOCYSTIC CYSTOMA OVARII.

(Paucilocular, non-adherent cyst; multiple cysts, Farre.)

This includes the simple or monocystic (unilocular) cyst of various authors, as well as the cystoma of a limited number of cysts (Fig. 19) before alluded to; whether we maintain or not, with Rindfleisch (which I do not), that no monocyst is originally so, but is always derived from the oligocyst. Boinet divides simple cysts, with reference to their contents, into the

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[1] Dr. Jeaffreson gives her name as "Tippus." See "Philosophical Transactions," vol. lxxiv., p. 471.

[2] See also South's edition of "Chelius's Surgery," vol. iii., p. 216.

"hydatic," with contents clear as spring-water; the serous or ascitic; and the hematic (sanguineous) or purulent, but not gelatinous. He states that the unilocular cyst is less common than the multilocular, since it becomes multilocular as it becomes more developed (p. 100). I. Baker Brown also assents to the last part of the statement. For me, there are very few tumors of sufficient size to demand practical interference, which are originally monocystic, and those which are apparently so before a tapping often show themselves to be evidently not so afterward; while, on the other hand, the fusion in some cases of several cysts into one is equally certain. But it is the first form of cystoma—the oligocyst—which becomes the monocyst, and *vice versa.* The true polycyst has other distinctive tendencies; but it does not become a monocyst, nor is it derived from the latter. The actual monocyst, therefore, should be, as Boinet asserts, the least common of all the forms of cystoma ovarii, but not for the reason he assigns. With Boinet and most other authors, all cysts which are not simple unilocular ones are termed multilocular. Dr. W. L. Atlee's case, No. 208,[1] was a monocyst apparently till the patient had been tapped six times. It then became oligocystic, weak-walled, and everywhere adherent; as was shown by the fact that a tumor remained at the upper part of the abdomen after the sixth, seventh, and eighth tappings.

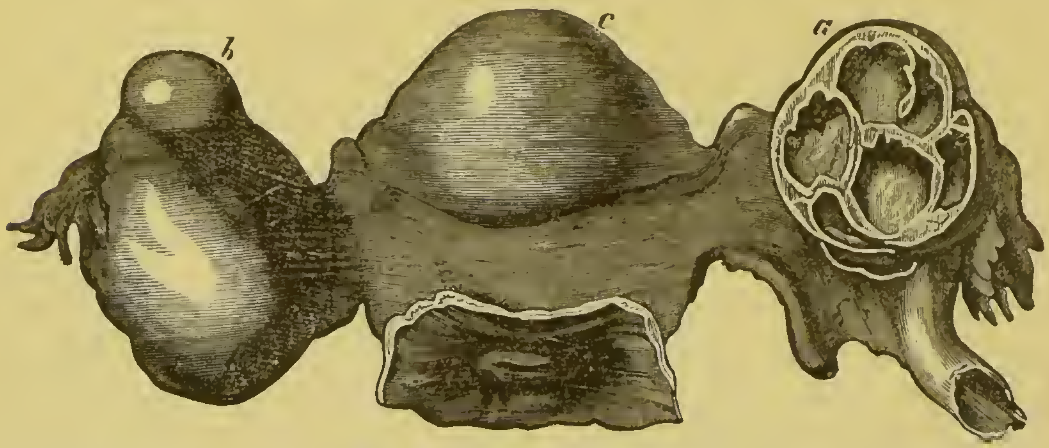

FIG. 19.—OLIGOCYSTIC CYSTOMA.

a, right ovary, exhibiting numerous cysts, consisting of enlarged ovisacs; *b*, left ovary similarly affected, but unopened; *c*, uterus.—(After Hooper.)

It is, therefore, not a matter of much anatomical interest whether an ovarian tumor is found to be a monocyst, or to consist of several cysts; since many (Rindfleisch says all) monocystic tumors were once more than a single cyst. But we also find a form of tumor in which the number of cysts is always *limited;* there may be a single cyst even two feet in diameter, or there may be several cysts—two to perhaps twenty or thirty, or more—the tumor being no larger than a man's head. On the other hand, there is a form of ovarian tumor of which the cyst-development has no assignable limits. The first is the *oligocystic*, and the second the *polycystic* tumor. I derive the following description of both varieties mainly from Rindfleisch:

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[1] *American Journal of Medical Sciences*, April, 1870, p. 378.

> The *walls* of the *oligocystic tumor* of the ovary are smooth, not very vascular, comparatively thick, and scarcely adherent to the organs in contact with them. Under the microscope they present several well-developed lamellæ of connective tissue, averaging about $\frac{1}{7500}$ inch (.003 mm.) thick, except the innermost, which, at least in cysts not larger than the fist, is of embryonic tissue, and is covered on its surface toward the cavity with papillary vegetations of various sizes. Upon this layer lies a double layer of cylinder epithelial cells, which invests the inner lamina just mentioned and all its papillæ—being most exuberant over and upon them.
>
> The *contents* of *oligocysts* (termed multiple cysts by Dr. Farre and others) are, if small, a concentrated colloid substance of amber-color; if large, a less dense fluid, together with fatty and cellular products of the epithelial lining. It sometimes, to the naked eye, resembles ascitic fluid, and contains more or less albumen. It, however, generally varies somewhat in the different cysts, if there be several, but not so strikingly as in the next class.
>
> The papillæ just mentioned, projecting from opposite directions into a closed cavity, must converge as they elongate, and finally come into contact with each other, and coalesce in various ways—often, as the fingers of one hand may be inserted between those of the other (Fig. 20). Cauliflower-like excrescences are therefore often found projecting on the inside of these tumors; and sometimes pedunculated cysts as large as the fist are produced, which, though smooth externally, show on section that they are true papilloma. But even the smaller papillæ, the scarcely prominent ones, often coalesce at their inner extremities, thus including some epithelial cells in a closed cavity, and, which continuing to secrete, a new cyst is formed. This, indeed, is the only way in which, in this first form of cystoma, new cysts can be formed. It is, however, an exceptional phenomenon; and we may still assert that, as compared with the second form, this, the first, is characterized by a limitation of the number of its cysts. The reason of this is simply that, in this form of tumors, a certain limited number of ovisacs were the origin of the tumor. The proof of this position

would be afforded by the actual detection of the ova in the smaller primary cysts; and this has been done, though, up to the present time, only in a single specimen in cysts about the size of a cherry (Rindfleisch). Indirect proofs are, however, numerous:

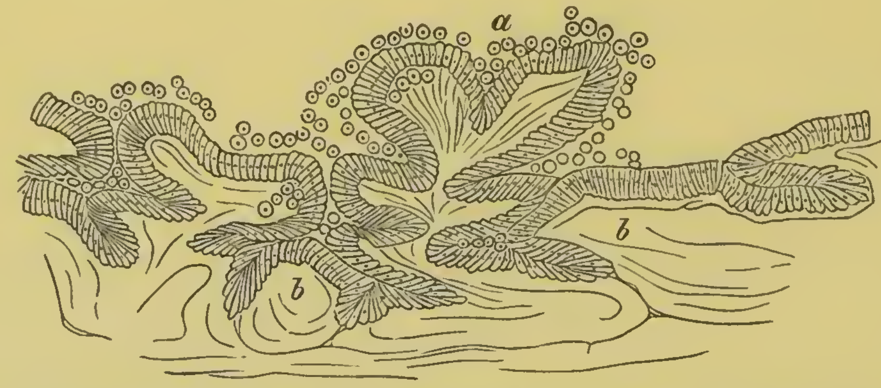

FIG. 20.—Transverse Section through the Innermost Layer of an Ovarian Cyst of the Size of a Fist, which originated from Colloid Degeneration of Several Ovisacs.

a, papillary excrescence, slightly flattened, covered by cylinder epithelium; *b*, subepithelial layer of connective tissue, divided into papilla-like portions, the grooves between which are lined by epithelium, and resemble glandular tubes. Two hundred diameters.—(Rindfleisch.)

1. No cysts are found smaller than average-sized ovisacs.
2. Even the smaller cysts are provided, like the ovisacs, with a complete epithelial lining which is subject to a periodical renovation.
3. There is here a striking analogy with certain cystic developments in certain glands, especially the testis and the mamma; and, above all, with the intra-tubular papilloma of the latter. The process is, however, here more evident than in the mamma, from the occlusion of the ovisacs, of which the preformed glandular (epithelial) structure is the probable starting-point (Rindfleisch).

The frequent occurrence of monocysts in this class is accounted for from the fact that only a limited though often considerable number of cysts can be formed from the limited number of ovisacs. These cysts, coalescing from atrophy of their walls, form one cyst, sometimes a very large one, since no new cysts can subsequently be formed. Secondary cysts may be formed from the papillæ as already described; but these are all endogenous, of course, and easily distinguished in a specimen. The free extremities of the papillæ sometimes project within the cyst as before stated, and give a mushroom or cauliflower appearance, which Dr. A. Farre has described as follows:

These pedunculate or dendritic processes appear at first in scattered patches, under the form of little round grains, thickly covering the lining membrane, which they raise above them, and are so closely set, that two or three hundred may sometimes be counted in the space of a square inch. When these elongate, mutual pressure causes them to assume a filamentous condition; but, when greater freedom of growth is enjoyed, their extremities commonly dilate into little pouches, or buds of another order sprout from the sides and extremities of the original growth, and convert them into a multitude of little dendritic processes, which roughen the inner surface of the larger cysts, or fill more or less completely the cavities of the smaller ones. If a section be made of these dendritic processes, they are seen usually to be solid at their base, the white fibrous tissue of the parent cyst-wall, from which they spring, being easily traced into their stems and branches. But at their extremities they become dilated into little pouches filled with fluid, similar to the little pediculated cysts, with which they are abundantly intermixed. These little cysts and processes are covered by epithelium, and it is probable that they are the active agents in the elimination of the various fluids by which the ovarian cysts, of whatever order, are commonly filled.[1]

We may now understand how the abnormal development of the papillæ within one of the cysts of a tumor of this class may be mistaken for medullary cancer of the ovary, as stated on p. 20. So long as the cyst containing the cauliflower-like excrescences mentioned on the preceding page, as formed from an hypertrophy of the papillæ, remains closed, no such appearance is presented. But, if the cyst bursts, its fluid escapes into the peritoneal cavity, and the papillæ, left free to project from the collapsed cyst, and to increase in length and size generally, assume the encephaloid or dendritic appearance[2] above mentioned. We may also understand why, in these circumstances, ascites also coexists with the cystoma; since the secretion from the remaining portions of the cyst is now poured directly into the peritoneal cavity. Besides, its contact with the peritonæum very probably produces an hypersecretion by the latter. Ascites, therefore, coexisting with a small ovarian tumor, is no proof that the tumor is malignant. Fig. 21 shows an ovarian oligocyst of the kind now under consideration. It was removed by ovariotomy by Prof. Thomas, in July, 1871. The other ovary showed a large oligocyst, presenting nothing peculiar; and there was also ascites. One of the cysts of the tumor here shown had burst, and thus allowed the hypertrophied papillæ to protrude, and, on opening another cyst, it also was found to present the same condition internally. The patient recovered.

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[1] "Cyclopædia of Anatomy and Physiology," Supplement, p. 581.

[2] I refer Mr. Wells's cases, 42 and 52, termed adenoid tumor, to this category.

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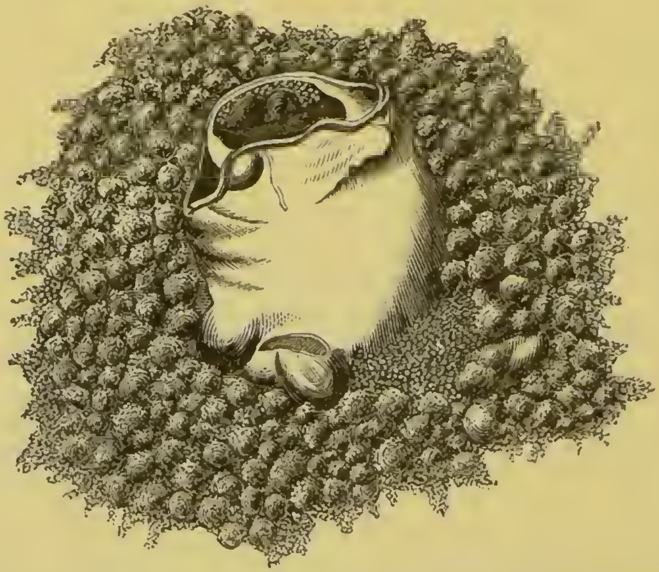

FIG. 21.—Small Ovarian Oligocyst containing Largely Hypertrophied Papillæ. One cyst had burst and allowed the papillæ to protrude into the peritoneal cavity; their great size and vascularity giving them the appearance, to the unaided eye, of an encephaloid mass. The closed cyst was found on incision to be also undergoing the same change within.

I had a case of double ovariotomy[1] in August, 1862, both ovaries presenting masses of this encephaloid-like growth as large respectively as a four-quart and a quart measure. The case was also complicated with ascites. The patient recovered, and is still in perfect health. In six other cases of ovariotomy, I have removed tumors of this kind, and all the patients but one recovered—that one dying of septicæmia. This papillary growth is, however, we may believe, not very rapid. My case, first mentioned above, had been developing for nearly three years. But the fluid had been rapidly produced, since she had been tapped twenty-six times in the last two years, the amount of fluid varying from twenty to thirty pounds at each tapping.

Finally, it may be added that calcification of the walls of oligocysts, and fatty degeneration of their epithelial layer, are not uncommon.

Whence comes the colloid substance filling the cysts? From the metamorphosis of old epithelial cells? Or is it a secretion by them? This last idea alone is defensible. I have had a patient whom I tapped several times, and who filled the cyst at the rate of one and one-half pound per diem, during the intervals between the tappings. This fluid could not have been produced by the mere involution of epithelial cells, though we frequently find cast-off and unaltered epithelial cells in large quantities in the cystic contents. We have seen that Prof. Rindfleisch believes that the ovisacs normally produce a certain amount of this colloid substance, and that this, being tumescent, produces their normal rupture in the manner before described (p. 11).

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[1] Reported in *American Journal of Medical Sciences*, April, 1863, p. 385.

THE POLYCYSTIC CYSTOMA OVARII.

(Multilocular cyst.—Proligerous cyst.—Compound cyst.)

Boinet includes, under the multilocular or compound cyst, every variety except the simple or monocystic cyst; though he mentions but two forms of it, (1) one with gelatinous and (2) the other—the proligerous cyst—with every variety of contents. In this work the polycystic cystoma includes all the forms of large ovarian cyst, except the dermoid, and the oligocystic cystoma just described. I adopt Rindfleisch's description of it.

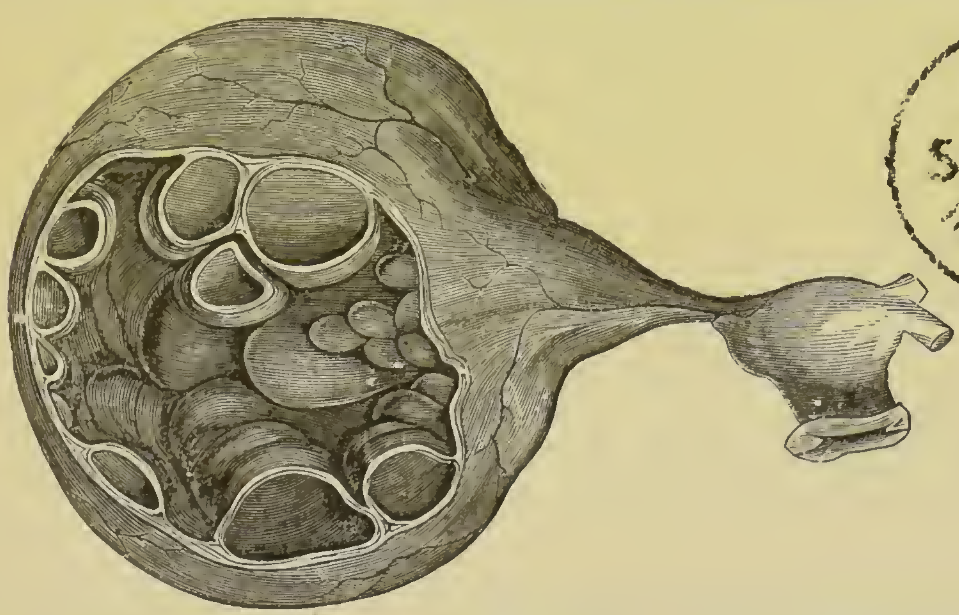

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FIG. 22.—THE LEFT OVARY DISTENDED INTO ONE LARGE CYST. into the interior of which project numerous smaller cysts of a secondary order. To the right of the figure is the uterus.—(Farre)

This form of cystoma seldom affects both ovaries. It is often of a very large size, but does not afford single cysts of such colossal size as are sometimes met with in the preceding variety, being composed of some large, many smaller, and still more very small cysts (Fig. 22). It occurs more frequently than the preceding form; and in mass sometimes transcends the largest oligocysts, since its development is limited only by the pressure to which it is subjected. Its larger cysts are frequently constricted, and at these points may be recognized the remnants of previous dissepiments, in the shape of fenestrated membranes, or vascular cords evidently undergoing a gradual absorption. Sometimes bands have formed from a spontaneous rupture of some of the cysts—an accident far more common than with the preceding form of cystoma.

If the contents be removed by tapping, they are more speedily reproduced, and the mass grows more rapidly than in case of the oligocyst. New cysts are constantly formed, and when they are very numerous, it has been called the proliferous cyst. Dr. Farre describes this form of the polycyst as follows, his description being somewhat colored by his theory of their origin from ovisacs:

> In these cysts, a second or it may be a third order of smaller cysts is developed, within or upon the walls of a larger or parent sac. From these walls, the secondary cysts, at a comparatively early period of their growth, are seen projecting inwardly in hemispherical form, arranged along the parietes of the sac, from which they commonly spring by broad bases. These secondary cysts are invariably and permanently attached to, and continuous with, the walls of the superior cyst. They are covered by a continuation of the same membrane which lines the principal sac, and which is reflected over them in the same manner that the heart is invested by the reflected pericardium, or the testis by the tunica vaginalis.[1]
>
> The growth of these secondary cysts with broad bases, of which a good example is exhibited in Fig. 22, is often very irregular, so that one or more of them, enlarging with greater rapidity than the rest, encroach upon the cavity of the containing cyst, and fill it more or less completely. This rapid enlargement of the secondary cysts also occasionally causes rupture of their walls and the escape of their contained fluids into the parent cyst, followed by the unrepressed growth of the secondary or tertiary cysts which arise from its surface.
>
> After the appearance of a tertiary order of cyst within the secondary ones, their growth occasions so much disturbance of the even outlines of the walls in which they originate, that it is often difficult to trace the order and manner of enlargement of the different series. Nevertheless, with care, these may be often made out even in the complex forms, of which Fig. 23 furnishes an example. Here is represented a small portion of an enormously-enlarged ovary, consisting of a primary principal sac, the

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[1] Hodgkin, "Lectures on Serous and Mucous Membranes."—(Lect. viii.)

greater part of which has been cut away, so as to leave a part of its walls visible at *a*, *a*, *a*, and of a more solid basis, which was made up of numerous secondary and tertiary cysts. Both of these orders may be traced in this example. At *a*, *a*, *a*, are seen the divided walls of the original parent-cyst, while springing from these walls, at *b*, is a single secondary cyst, and at *c*, *c*, are two groups of similar cysts aggregated in masses. The latter are, however, examples of compound secondary cysts, for in the interior of each is contained a series of a tertiary order, which are so numerous as to fill completely the secondary sacculi.[1]

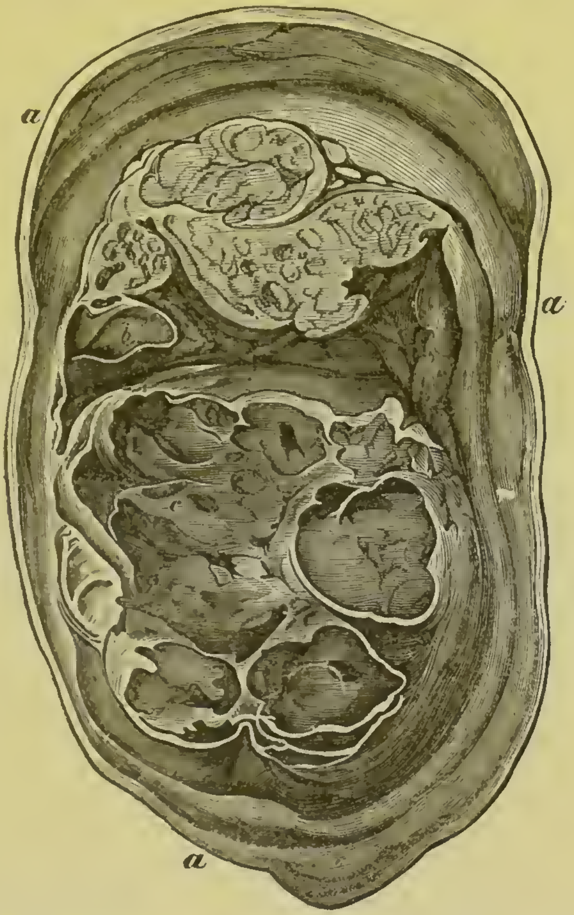

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FIG. 23.—Compound or Proliferous Ovarian Cyst.—(*Ad. Nat.*)

a, *a*, *a*, divided walls of the principal single cyst; *b*, small, simple cyst; *c*, *c*, two masses of compound secondary cysts, containing many of a tertiary order.

The following form of polycyst is easily mistaken, on a casual examination, for an oligocyst.

To the ovariotomist, before removal, it appears to be a monocyst, but, on evacuating the large single sac, a mass apparently solid is found having the same relation to the former as has the placenta to the fœtal membrane. On section of this portion, however, it presents areolæ of various sizes, like those of a very coarse sponge, sometimes freely communicating with each other, and being filled with the dense colloid substance usually found in the smallest cysts of polycystic tumors.

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[1] "Cyclopædia of Anatomy and Physiology," Supplement, p. 581.

The *surface* of this species of cystoma is generally adherent to the peritonæum, where it touches it, by a great number of inflammatory adhesions, and in which large veins appear, giving rise to hæmorrhage when ruptured by the ovariotomist.

The *walls* are comparatively thin, and easily torn, and frequently pigmented on their interior. Indeed, a large cyst of this kind is not seldom spontaneously ruptured, while the preceding variety seldom gives way. Sections of the wall, seen under the microscope, show no such regular formation of connective tissue as is represented by the laminæ in the walls of the oligocystic form of cystoma. This is also true of the bands and dissepiments of the interior, as well as of the firm and pretty solid external envelope. All these parts consist, indeed, of connective tissue, but it is sprinkled with cysts of small, and of the very smallest dimensions, and which may be traced down to their very commencement. The smaller cysts contain in their colloid contents a fibrous something which stretches across their interior like a cobweb. The smallest can be seen only with a microscope.

The *contents* of this variety of cysts are a colloid material, as in the first variety; but it is more habitually of a brownish color, from the frequent admixture of blood and blood-pigment. The fluid in the smaller cysts is more dense than that in the larger, as in the first form of cystoma. From cysts of all sizes it is more irritating to the peritonæum than the fluid of the former kind of cystoma; and hence, if spontaneous rupture of a large cyst occurs, peritonitis is very sure to result, while it seldom follows a rupture of the oligocystic cystoma. If the cysts be small, and arranged like a honey-comb, we have what is called by some writers the vesicular cyst, and by others the alveolar cancer of the ovary. Cruveilhier and Mr. Wells regard this form as cancer (Boinet, p. 104). I do not, and have removed two such cysts by ovariotomy, the patients having already lived more than twelve years since the operation. I find in these cases only the condensed colloid secretion characteristic of very small cysts, with other elements. Fig. 24, from Cruveilhier, represents the so-called areolar cancer, and which is described by Dr. A. Farre[1] as follows:

> Embedded in the jelly-like substance of the alveolar contents may be found opaque, white masses, resembling blanc-mange or thick cream. Intermixed with these contents, in varying proportions, are found nucleated epithelial cells, oval corpuscles, oil granules and molecules, and delicate filaments.
>
> Besides these contents, he adds, there may often be observed, hanging into the interior of the alveoli, and sprouting from their walls, clusters of leaf-like clavate or villous processes, such as are observed in that variety which has more particularly received the name of villous cancer. But it frequently happens that the alveolar type of structure is not generally diffused through the mass. This may form only a small portion of the diseased ovary, while the greater part is composed of one or more large cysts, with contents similar to those first described.

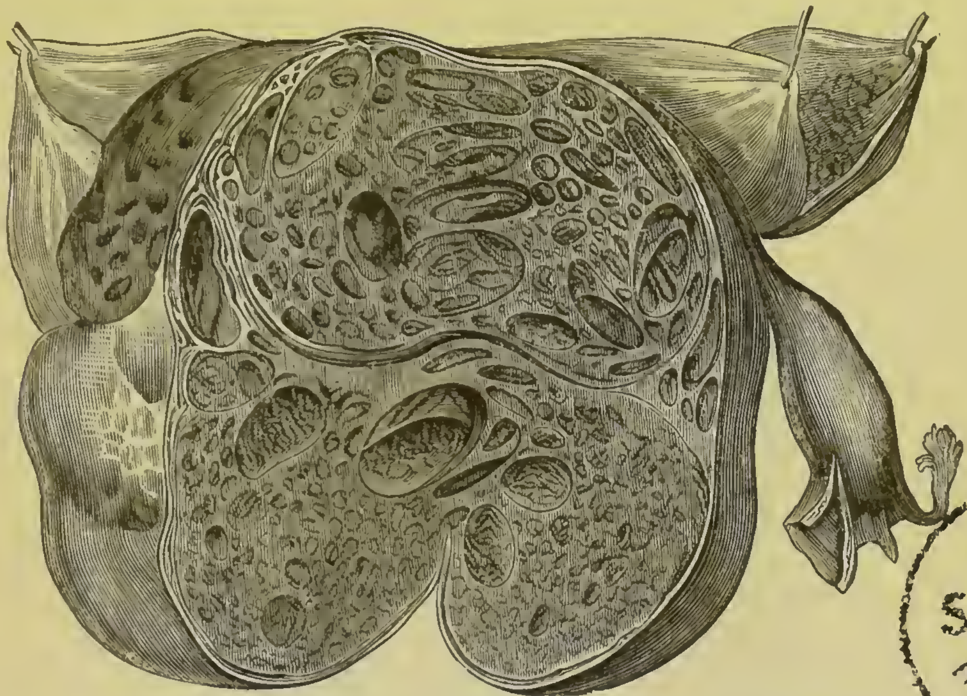

FIG. 24.—So-called Colloid Cancer of the Ovary.—(Cruveilhier.)

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We recognize in the last paragraph a description of the papillary development occurring in oligocysts, which has already been explained (p. 45).[2] The characteristics of this form of cystoma ovarii which have been specified would seem to refer it to an origin entirely different from that of the oligocyst. Still, Paget and others maintain that this form also originates in the ovisacs. The reasons in opposition to this idea, as proving that they originate from the stroma of the ovary, are so well stated by Rindfleisch, that I shall reproduce them at length:

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[1] "Cyclopædia of Anatomy and Physiology," Supplement, p. 593.

[2] Kiwisch also describes these villous excrescences (pp. 184, 185) as belonging to alveolar cancer.

> On making fine sections of the firmer parts of the tumor for microscopical examinations, we soon convinced ourselves that uninterrupted accumulations of fibrous, well-organized connective tissue are rare, even where a white and tolerably firm substance forms either the outer covering of the tumor or a broader framework of the interior. All these parts consist, indeed, of connective tissue, but here it is infiltrated with very small and still smaller cysts, which may be followed to their very first beginnings (Fig. 25). The drawing represents the interior condition of a trabecula of the stroma, separating two somewhat larger cysts, *a*, *a*, from each other. We immediately perceive that the here striated connective tissue, forming the basis of the structure, subdivides into numerous smaller trabeculæ, and with them comprises and permeates a group of small cysts. Of course, we must not take these trabeculæ to be cylindrical, as if turned off; they are rather but apparent trabeculæ, and in reality the transverse sections of

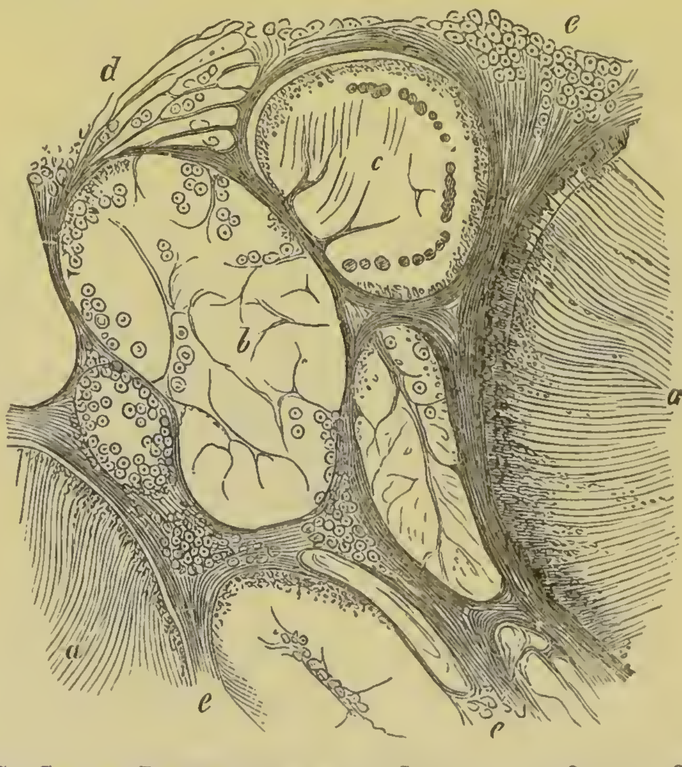

FIG. 25.—Colloid Degeneration in the Stroma of an Ovarian Cystoma.

a, *a*, larger cysts with walls lined by short epithelium, the contents of which, when hardened, split in a radiating manner; *b*, a cyst of more recent date, without epithelium, and traversed by some remnants of connective-tissue fibres; *c*, the same with a wreath of separated epithelium; *d*, colloid infiltration of the connective tissue which has not yet attained to cystic development; *e*, infiltration of the stroma with small cells. Two hundred diameters.—(Rindfleisch.)

membranous septa of different thickness. Here and there the connective tissue is freely infiltrated with young, round cells, a proof that it is in a state of formative irritation. The idea might occur that a certain larger aggregation of these cells (*e*) represents the first stage of cyst-formation—of cyst-beginning; for some of the smallest cysts (*c*, *d*) appear exactly as if only a certain quantity of colloid substance had found its way between the cells of such a small group, crowding it asunder in every direction. Such an explanation has, indeed, been attempted by several authors. The knife might very easily have cut the extreme point of a larger cyst, and thus have produced only a deceptive representation of a very small cyst. I shall, therefore, not deny the possibility of such a manner of origin; yet I should make the definition somewhat broader, and speak only generally of a circumscribed colloid softening of the connective-tissue stroma, as the starting of cysts; for it seems to me that certain tumefied and translucent portions of the stroma (*d*), which are not exactly round and clearly defined, might also be considered as cyst-formations. The colloid substance is here exuded more diffusely between the fibrous components of the stroma; yet this effusion, in swelling further, must necessarily tend to assume a ball-shaped appearance; and, the longer the time, the more would it shape itself into a roundish space intersected by septa of connective tissue. If we, however, compare the probable future of the portion "*d*" with the real state of the smallest cyst-specimens *b*, *c*, etc., we must confess that the other theory gains in probability. Most of the smaller cysts are permeated by a system of septa of connective tissue, and I can assert—what cannot indeed be seen in the drawing—that sometimes even capillary vessels pass directly through the cyst. Such observations are not compatible with the hypothesis that these cysts also proceed from ovisacs. The idea of an ovisac is not suggested until the cyst has reached a circumference quite extensive in proportion to these primordial formations; for in the larger cysts an epithelial stratum, even if not always complete, is found, and the colloid substance, without further fibrous additions, is, in hardened preparations, stratified in a manner pointing to a secretion from the walls. It is also undoubtedly apparent, from other reasons, that cysts generally are to be considered secreting cysts after having attained a certain size. Where could the large quantity of blood-albumen, present in all large cysts, come from, unless transuded from the vessels, and consequently secreted from the walls? In our case, however, we have to deal, not with follicles, but with that transformation of original softening cysts into secreting cysts which I have explained in detail on pages 64, 65.

To resume: we find that the second form of ovarian cyst, which is remarkable for the unlimited formation of new cysts, depends upon a colloid degeneration of the stroma ovarii. Some consider it directly a carcinoma colloides cysticum (pp. 450–452).

Kiwisch accepts the preceding view of the origin of the polycyst, and terms it "alveolar degeneration of the ovary"(p. 189).

I have already discredited the malignant character of all the varieties of this form of cystoma. Rokitansky, however, thinks some of them to be decidedly cancerous. Lebert holds the opposite opinion. But cancer may be developed in a polycyst as a secondary deposit.

In cases of polycysts, we also sometimes find small cysts free in the peritoneal cavity with the most delicate, transparent walls. They are destroyed by the most careful handling.

DERMOID CYSTS OF THE OVARY.

The dermoid cyst is not, like the two forms of cystoma, a neoplasm peculiar to the ovary; but must be here described, both because it is developed in the ovary more frequently than in any other organ, and because it not seldom attains to such dimensions as to necessitate its removal by the ovariotomist. The tegumentary character of a part or the whole of its internal surface has been shown by Cruveilhier, Kohlrausch, Lebert, and Paget; and it is from the fact that some portion of this surface presents the structural elements of skin, that such cysts have been termed dermoid cysts.[1]

They generally affect but a single ovary, but sometimes both, and are themselves single cysts, though a large number of small cysts have been found in the same ovary. They do not grow so rapidly, nor attain, generally, to such dimensions as the cystomata previously described, being seldom larger than the adult head. They almost always present a secreting surface within, in addition to the dermoid portion, so that their contents are always to a greater or less extent fluid. This fact excludes them from the category of the solid ovarian tumors.

In some exceptional cases, however, dermoid ovarian cysts have become very large. Blumenbach reports a case in which a cyst of the left ovary weighed fourteen pounds, and hung below the patient's knees. Its contents weighed forty pounds more, and made her circumference four ells[2] (a mistake, of course). It commenced at the age of seventeen, and she died at thirty-eight years. They increase partly by new formation in the cyst-wall, and partly from accumulation of the secretion of the dermoid, and the remaining surface, in the cyst. We have to consider:

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[1] The term piliferous cyst is rejected, as not sufficiently broad, developmentally considered.

[2] The shortest ell (Flemish) is twenty-seven inches; the longest (French) is fifty-four inches; and four ells are one hundred and eight to two hundred and sixteen inches, or nine to eighteen feet.

I. The wall of the cyst.
II. Its contents.

I. The *cyst-wall* is generally thick, and has at least two layers:

1. The external layer consists of diverging connective-tissue fibres, enclosing fat-cells—a true panniculus adiposus (i. e., a never-absent layer, like the loose, subcutaneous areolar tissue, abounding also in fat-cells). Masses, one-half an inch in diameter, of yellow fat, in this layer, are sometimes seen protruding into the cavity of the cyst.

2. The inner smooth layer is a skin with its corium, sometimes but not always presenting papillæ; a stratum Malpighianum, and an epithelium of thick layers of cells, usually non-nucleated. This last layer is one line thick. Here also we find hair-follicles, and sebaceous glands opening into them, and, according to Kolrausch, Heschl, and others, sweat-glands also.

II. The *contents* of dermoid cysts are:

1. A smeary mass resembling vernix caseosa, consisting of cast-off epithelium-scales, and sebaceous fluid, a yellow, fatty grease (Klob), like lard or butter, more or less soluble in ether; and in this—
2. Hairs, and teeth, and sometimes bone, and other tissues.
3. Cholesterine-crystals, sometimes so abundant as to give the contents of the cyst a glistening appearance.

1. **Hairs.**—Of the accidental contents of dermoid cysts, hairs are the most frequent. They are sometimes found attached to the dermoid surface, and springing from follicles, but are usually rolled up in separate balls, or masses elongated like a finger. Sometimes they are enclosed in a capsule, entirely isolating them from the internal surface of the cyst.[1] They are more frequently reddish-blond than brown or black, bearing no resemblance in color to the hair of the patient. Andral found hairs in an ovarian cyst of a negress, which were soft, smooth,

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[1] Kiwisch, p. 227.

red, or blond, and some were silvery, like the hair of white children. They are very often fine, like wool, and they vary in length from four to six inches, or more. In Blumenbach's case, before alluded to, there were hairs two feet long; and Boinet remarks that they are sometimes as long as are ever found elsewhere. A dermoid cyst removed by me in July, 1869, by ovariotomy, contained reddish hairs, four inches to one and a half foot long, rolled up in five distinct balls of various sizes, each being, however, by a few hairs attached to another one.

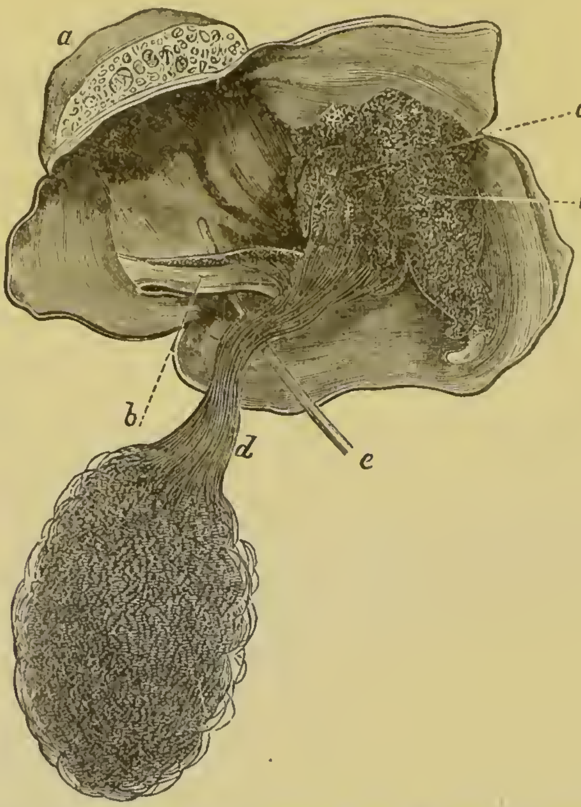

FIG. 26.—Ovarian Cyst containing Hair, Loose Fatty Matter, Adipose Tissue, Sebaceous Glands, and Hair-Follicles.—(Cruveilhier.)

It contained no teeth or bones, but a large amount of fatty matter, resembling very soft butter, and epithelial cells, as is usually the case where only hairs abound in a cyst. Indeed, we might count upon this relation of these two elements of the cyst-contents, since the hair-follicles and the sebaceous follicles are associated here, as everywhere else, in the skin. Dr. G. F. French, of Portland, Me., describes a dermoid cyst containing two hard balls, of fine black hair, two and three inches in diameter, embedded in yellow, sebaceous matter, which filled the cyst. Thirty or forty hairs were still attached to what seemed a small piece of scalp.[1] Mr. G. W. H. Coward reports, in the *Lancet*, p. 216, vol. i., 1856, a case, in tapping which a mass of hair resembling tow in appearance was withdrawn—as much as could be grasped in the hand. Some hairs were two feet in length.

2. **Teeth.**—But the most remarkable of the contents of dermoid cysts are teeth. Very frequently they number from a single one to ten. I have seen nine in a single instance, and a smaller number in several other cases. But they are sometimes found in numbers truly surprising. Cleghorn had a case, cited by Meckel, in which there were forty-four teeth. In a case reported by Schnabel,[2] there were more than one hundred teeth of all varieties; and Ploucquet's case had three hundred! They are either developed upon a bony foundation, as is most common, or lie on the internal surface of the cyst, their crowns lying within its connective tissue, or projecting into its cavity. Sometimes, however, they are connected with cartilage, and are perfect incisor, canine, or molar teeth. Sometimes they are contained in capsules. These typical forms, however, are not generally met with. Frequently, only the crowns and bodies are developed, and often even these are only rudimentary. But they are actual teeth, presenting the dentine, the enamel, a homogeneous enamel membrane, and the cementum. But sometimes, on well-developed teeth, the enamel is absent. The most perfect forms have also a body, neck, and fang.

Meckel ascertained that these teeth are subject to the same laws, as to duration and development, as normal teeth—successive sets being produced. Dr. S. J. A. Salter found nerves distributed to their pulps.[3] And there is a specimen in Rokitansky's museum, in which a milk-tooth, as it may be called, is atrophied from the fang up into the body by another tooth behind it, which is the analogue of a persistent tooth. If a cyst contains teeth, and but few hairs, its fluid contents are generally of a gelatinous character.

3. **Bone.**—Osseous tissue is generally found in dermoid cysts in the form of small scales firmly embedded in the connec-

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[1] "Transactions of Maine Medical Association," 1871, vol. iv., part i., p. 145.

[2] Kiwisch, *op cit.*, p. 230.

[3] "Guy's Hospital Reports," 1860, p. 241.

tive tissue of the cutis. Sometimes, however, it assumes the shapes of certain bones, and, if teeth be also found implanted in them, it requires no great effort of the imagination to discover in them portions of the maxillary bones. I have seen six teeth thus implanted in a bone in one instance, and nine in another. In Blumenbach's case there were eight irregular pieces of bone, one of them eight and another ten inches long, and one of them having implanted into it six molar teeth and one incisor, all completely formed. In Schnabel's case[1] there were several fragments of bone, besides more than one hundred teeth, of all varieties, with fangs imperfect or partly absorbed. This cyst occurred in a girl, thirteen years old, who had never menstruated, and it was three times the size of an adult head.

These are all true bony tissue, presenting concentric lamellæ, lacunæ, pores (canaliculi), and blood-vessels; but the lacunæ are larger and fewer than in bone, and the canaliculi are less numerous. In some cases these bones present a medullary canal containing marrow. Heschl reports a case in which a bone, one inch long and three lines thick, and shaped like a horseshoe, was connected with the loose connective tissue by normal periosteum. It also had several processes to which small cartilages were distinctly articulated by loose capsular ligaments. Vanderwich saw a small, hollow bone, with an external covering like a periosteum, and lined within by a membrane analogous to the dura mater. And Boinet reports a case p. 116) in which a bone as broad as the palm of the hand, and resembling the scapula at one extremity, divided at the other into three acute-angled processes resembling the inferior maxillary bone. Is was apparently covered by cartilage.

Muscular tissue and nerves have also been repeatedly demonstrated in dermoid cysts; the latter, first by Mr. Gray.[2] Boinet cites a case of the former kind, and he alone states that nails have been found in them. The following interesting case is described in one of Rokitansky's lectures:[3]

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[1] Kiwisch, p. 230;. from Wurtemburghisches "Correspondenzblatt," 1844, B. 14, No. 10.

[2] "Medico-Chirurgical Transactions," vol. xxxvi. (1853).

[3] Published in Zeitschrift der Wiener Aertzte, 3 Jahrung, xii. Heft, p. 54.

The preparation is a cyst the size of a child's head, developed in the right ovary, consisting of three compartments, and containing fat and hair; upon its internal surface were situated extensive islands furnished with a dermoid membrane set with hairs, with a panniculus adiposus, and with numerous glands, which secreted a large quantity of lardaceous matter. From one of these islands a cylindrical bony growth projected, two and a half inches long, and the same in thickness, somewhat curved at its extremity, pointed, and enclosed in a general hairy integument, which consisted internally of a thin, compact lamellæ of large-celled medullary diploë, and in its form might be compared to a finger. Its base was rounded off, and was fixed, by means of some fibrous tissue, to a flattened piece of bone, and possessed a certain degree of motion. This growth was supplied by a vascular and nervous twig, which proceeded from the wall of the cyst in the neighborhood of its base; the former came from a considerable plexus, apparently venous; the latter, a gray, reddish trunk, about half a line in diameter, from a collection of red-colored ganglionic masses, which were enclosed in a capsule formed by the separation of the two lamellæ of the cyst-wall. Each trunk entered the bony growth and was distributed as far as its point, similar to the nerves of the finger, giving off in its course several twigs to the general integument; no muscular fibres were discovered in it.

Dermoid cysts are very frequently developed before puberty. Of eighteen instances of this kind, M. Pigné found that—

three occurred in fœtuses at eight months;
four " fœtuses at full term;
six " children from six months to two years;
five " virgins under twelve years of age.

I have had a case of dermoid cyst in a girl of nine years, and consider this form of cyst always congenital. It occurs in the male also, and most frequently in the testis, though, in either sex, it may occur elsewhere than in the sexual organs, e. g., in the lungs. Alleged dermoid cysts of the uterus must, however, be explained on a different ground. I reported a case to the New York Pathological Society in 1865, in which a mass of reddish hair had been expelled apparently from the uterus after labor. The cyst, being ovarian, had been ruptured during labor, the rupture extending through the wall of the cervix uteri into its canal, just below its junction with the body of the uterus, and through which the mass of hair passed.

Dermoid cysts are more liable to become inflamed and to suppurate than the two forms of cystoma, and thus to discharge their contents by the rectum or the vagina. This probably depends on the more irritating nature of these contents. The origin of this class of cysts still remains unexplained, but will be discussed in a subsequent section.

Relative Frequency of the Three Varieties of Ovarian Cysts.

Of sixty cases of ovarian cysts examined *post mortem* (forty-one reported by Scanzoni, and nineteen by Dr. West),[1] there were:

Simple cysts	15
Polycysts (two termed cysto-carcinoma)	44
Dermoid cyst	1

Of all the forms of ovarian tumors the fibroma constitutes decidedly less than one per cent., and may be stated at one-half per cent.; the true monocyst constituted three per cent. in Dr. Keith's cases; the dermoid cyst may be estimated at one and one-half to two per cent., the oligocyst at thirty-eight per cent., and the polycyst at fifty-seven per cent. Carcinoma is about as frequent as the fibroma.

But dermoid cysts doubtless occur more frequently than they are recognized, even by ovariotomists. I recently showed an oligocyst, as it was believed to be, to the class of the College of Physicians and Surgeons, consisting of a single sac, and an apparently solid portion, like the form described on page 49. On inverting the large cyst to examine the small ones making up the more solid portion, I found one of the size of a pullet's-egg, containing a clear, gelatinous fluid; and a cyst as large as a hen's-egg, containing hair and sebaceous fluid—it being, in fact, a dermoid cyst. The remainder of the mass consisted of a piece of bone, three and one-half inches long, curved like the inferior maxillary bone, with one incisor tooth inserted in it. The large cyst contained the usual ovarian fluid, and from this the dermoid cyst was entirely isolated, though projecting into its interior.

Considering, as I do, that the dermoid cyst is congenital, it may be suggested that its presence in the substance of the ovary is the exciting cause of the cystoma which accompanies and encloses it.

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[1] Kiwisch, p. 42, note.

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CHAPTER III.

GROWTH, DURATION, CAUSES, AND SYMPTOMS, OF OVARIAN TUMORS.

SECTION I.

GROWTH AND DURATION OF OVARIAN TUMORS.

1. **Growth.**—Since the ovary normally projects backward from the level of the posterior surface of the broad ligament (p. 2), it falls still farther back into the pelvis when increased in weight and size by cystic or fibroid degeneration; and frequently the uterus, being also carried backward by the traction of the ovary, is for the time retroflexed. This I term the first stage of its growth.

As the tumor increases, however, it rises from the pelvis, and is then first recognized by the patient in one of the ilio-hypogastric spaces. It is in a majority of cases easily movable across the median line to the side opposite its habitual location. If, however, it has become adherent in the pelvis, it is not thus movable at its upper part; and this form of adhesion is far more common in cases of polycysts than of oligocysts.

Having risen above the pelvis, it expands for a time pretty equally in all directions, and until it has risen to the umbilicus; and now its second stage is complete. By this time it has generally become so broad as to admit of but little, if any, lateral displacement by manipulation; its growth continues in the direction of the least resistance, i. e., upward, till it reaches the stomach and other organs in the epigastrium, when the third stage is completed; and then forward and laterally so as to give a large circumference above the umbilicus. This is the fourth and last stage. If the tumor be a polycyst, the largest cyst or cysts will therefore be found at its upper and anterior aspect, as was first noticed by Dr. Simpson.[1] As the tumor rises out of the pelvis, the uterus is again brought nearly into its normal position, but only to be soon crowded by the tumor to the opposite side, or into a state of latero-flexion, and finally, as the tumor increases in breadth below, the uterus is forced entirely behind it, and thus subseqnently remains. I have, in several instances, traced the changes I have just mentioned, in the course of an ovarian tumor.

The Fallopian tube of the affected side is seen rising upon the antero-lateral surface of the tumor often even to its summit.

The size acquired by ovarian cysts, before they demand surgical interference, varies much in different cases. A circumference of forty to forty-five inches is quite common. In the case of the patient from whom I removed one hundred and six pounds by tapping, the girth of the abdomen was six feet (seventy-two inches); and of the patient who yielded one hundred and forty-nine pounds and a fraction, it was six and a half feet (seventy-eight inches). Some patients, however, do not bear a distention of the abdominal walls beyond twenty-eight or thirty inches even, before a removal of the pressure becomes necessary.

The time elapsing from the discovery of the tumor by the patient, when it is usually three inches at least above the pubes, till surgical interference becomes necessary, therefore varies much in different cases. Polycysts are developed more rapidly than oligocysts; though polycysts ascending merely to the umbilicus sometimes produce more constitutional disturbance than much larger oligocysts, and for this reason necessitate earlier interference. And very sensitive patients can bear neither variety well. On an average, I should say that polycysts demand surgical treatment within a year, and oligocysts within a year and a half to two years, after being first detected by the patient. Cysts, however, with flaccid walls (and these are always oligocysts, I think), may be several years in filling—even ten or twelve years—to the extent demanding surgical aid. I shall have occasion to mention a cyst which existed over seventy-five years without being tapped, probably a dermoid cyst.

It is impossible to state, except in a very general way, how long a time is required for the diseased ovary to attain a size recognizable by the patient, or about the size of the uterus at the end of four and a half to five months of gestation. From observations of several ovarian cysts discovered at a very early stage, during the treatment of uterine affections, I think the average time is about two years for polycysts, and two and a half or more for oligocysts. They are developed most rapidly at the time of the menopause. Dermoid cysts, being congenital, usually require many years for their growth to a size to require operative interference, and are subject to no limit as to time.

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[1] *Edinburgh Monthly Journal of Medical Sciences*, 1852, vol. xv., p. 365.

Of course, since the ovary in its normal condition is not pediculated, an ovarian cyst at first has no pedicle. If it does not rise from the pelvis at all on account of early adhesions, except so far as the growth continues in its upper cysts, or in its upper portion if a monocyst, only a very short pedicle will be found. But, if it rises well out of the pelvis, a longer pedicle will be the result. Oligocysts, therefore, being less liable to remain in the pelvis from adhesions, present the best-developed pedicles. Such are from two to four inches long, and one to four inches broad; thicker at the two borders, containing the blood-vessels, and one of them the Fallopian tube also; and very thin in the central portion. The pedicle of a polycyst is generally short, thick (as the hand sometimes), and wide—sometimes even seven inches. A free mobility of the tumor after it rises from the pelvis indicates a long pedicle.

In case of large cysts of either kind, adhesions of limited extent may be expected of its anterior surface, at its upper portion at least, either to the parietal peritonæum, or the omentum, or both. But adhesions of the posterior surface of the tumor to the organs in the abdomen are due to abnormal conditions, and especially to inflammation of the cyst-walls. But adhesions are always more common, more extensive, and more vascular, in polycysts than in oligocysts, the other conditions being the same.

In exceptional cases the growth of ovarian cysts takes place at intervals; the pauses being of various length, and sometimes continuing for years. In rare instances, also, the fluid within the cyst undergoes a periodical increase and decrease. A remarkable instance of the tidal growth of an ovarian cyst, reported by Dr. Ritchie, will be quoted at length further on. Many patients, indeed, will assert that the tumor is regularly larger before each catamenial period, and undergoes a diminution after it. So far as this increase is actual, it is doubtless due to the greater fulness of the ovarian vessels during the menstrual molimen.

2. **Natural Duration.**—It becomes an interesting question, How long a time is usually required for an ovarian tumor to pass through the stages I have specified, to its fatal termination, if not interfered with? I here speak only of the two forms of cystoma ovarii. The fibroma seldom, if ever, goes beyond the second stage, and, like the dermoid cyst, has a very slow growth.

As our attention is usually first called to the cyst by the patient herself, it has already attained to the commencement of the second stage; and this question is therefore practically restricted to the second and third stages, and afterward. From the completion of the third stage, the fatal termination, in case of a polycyst, would not be postponed generally more than twelve months, and often not more than half that time; while the average with oligocysts is at least a year more. Without distinguishing these two forms of ovarian cyst, Dr. F. Bird found, of fifty cases, the following results: four died within one year; twelve died within three years; twelve died within two years; ten died within four years; twelve died within ten years. But these results I have not seen even approximately verified, unless tapping had been successfully resorted to. Only the flaccid cyst has, in my observation, gone beyond five years without tapping.

Cases, however, occur of great interest, of oligocysts, in which, by tapping, life has been greatly prolonged. I have had a case of thirteen years' continuance, of an ovarian cyst, with three tappings during the last one and a half year. Mr. Martineau's case continued twenty-five years, as before stated (p. 41), with eighty tappings. Dr. Druitt[1] had a case of immense ovarian tumor, existing over thirty years; and J. O. Frank reports a case[2] of ovarian cyst existing from the age of thirteen to eighty-eight, or seventy-five years in all. It was probably a dermoid cyst. Dr. R. P. Harris has reported a case of fifty years' standing, in the *American Journal of Obstetrics* for August, 1871.[1] Dr. John Clay gives the duration of the disease, before the operation of ovariotomy was performed, in one hundred and seventy-five cases.[2] In many of these, however, tapping had been resorted to; so that the results are not accurately available for the present purpose. The disease had existed—

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[1] "Vade Mecum," p. 465.

[2] "Médecine Pratique de Pierre Frank," p. 236.

6 to 12 months	in 32 cases.
1 to 2 years	in 42 "
2 to 3 years	in 28 "
3 to 4 years	in 19 "
4 to 5 years	in 11 "
5 to 6 years	in 15 "
6 to 7 years	in 5 cases.
7 to 8 years	in 4 "
8 to 9 years	in 1 case.
9 to 10 years	in 3 cases.
More than 10 years	15 "
	175 cases.

T. Safford Lee says that the usual duration of the disease is one to two years, the great majority terminating fatally within two years (pp. 119, 129).

On the other hand, the rapidity of development of ovarian cysts has, in exceptional cases, been said to be astonishing. Mr. T. Safford Lee[3] states that he has seen "a small ovarian cyst progress so rapidly in a *fortnight* as to acquire a large size, obstruct the breathing, and severely impede the vital functions." And Kiwisch has seen a "cyst, from the size of a fist to that of a child's head, appear in the course of from ten to twenty-four days, accompanied by severe local and general symptoms. Its daily enlargement was easily demonstrated by examination."[4] I suspect that the results of perimetritis, not then recognized, were in both these instances mistaken for ovarian cysts.

The period of life during which ovarian cysts are liable to be developed extends over more than sixty years. Dermoid cysts, being congenital, may become apparent at any age; oligocysts may appear from puberty till some time after the menopause; and polycysts at any time,[5] but very seldom before puberty. But Kiwisch found cysts in both the ovaries of a fœtus (p. 109). The youngest patient hitherto, from whom an ovarian cyst has been removed by ovariotomy, was six years and eight months old;[1] and the oldest, seventy-eight years.[2] Both these operations were successful. That these cysts are, however, far more common during the most active epoch of ovarian life, is precisely what we should anticipate. Dr. J. Clay found that two hundred and eighty-one operations of ovariotomy had been performed at the following ages; and the commencement of the cysts probably averaged about two years earlier:

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[1] Page 300.

[2] Kiwisch on "Diseases of the Ovaries," Appendix.

[3] On Tumors of the Uterus.

[4] *Op. cit.*, p. 112.

[5] Mayer, of Bonn, found a polycyst in each ovary of a child dead at fourteen days. They occur in the new-born, and in the fœtus, as above stated.

From 17 years to 20 years, 11 cases.
From 20 years to 25 years, 46 cases.
From 25 years to 30 years, 54 cases.
From 30 years to 35 years, 48 cases.
From 35 years to 40 years, 41 cases.
From 40 years to 45 years, 14 cases.
From 45 years to 50 years, 30 cases.
From 50 years to 55 (none in 53 and 54), 14 cases.
From 55 years to 60 years, 13 cases.
From 60 years and above, 4 cases.

The greatest number of cases for any one year was fourteen, and the same at twenty-eight, at thirty, and at forty-five years. The ten years including the greatest number of cases was from twenty-four to thirty-four years—one hundred and eleven cases.

SECTION II.

POSITION AND RELATIONS OF OVARIAN CYSTS.

As the position and relations of an ovarian cyst vary according to its stage of growth, I recapitulate the four stages before mentioned (p. 61):

First stage. The cyst is still within the pelvis.

Second stage. The upper extremity of the tumor has risen out of the pelvis, and is extending to the level of the umbilicus.

Third stage, includes the growth upward from the umbilicus to the epigastrium.

Fourth and last stage, is that in which the growth of the tumor is such as to increase its prominence and circumference alone, it having risen in the preceding stage to its highest point.

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[1] By Dr. W. B. Barker.

[2] By Dr. W. L. Atlee.

It is also convenient to speak of the middle of the second stage, the tumor reaching half-way from the symphysis pubis to the umbilicus; and the middle of the third stage, when it has attained to the point midway from the umbilicus to the ensiform cartilage.

First Stage.—While the cyst still remains in the pelvis, it lies behind the uterus and in front of the rectum. The uterus will not, however, long remain precisely in its normal position, its fundus being crowded from the side on which the tumor rises, while the cervix is inclined toward the affected side. Sometimes the uterus is next crowded also forward, and thus directly presses upon the bladder. If the uterus were retroflexed before the disease of the ovary commenced, the latter may not get between the rectum and the uterus at all during the first stage; in which case the uterus remains, however, rather underneath than behind the tumor. Now also the rectum will receive the combined pressure of the tumor and the uterus.

In the normal condition the uterus is never behind the cyst during the first stage of its growth. The broad ligament of the affected side becomes more and more stretched as the size of the tumor increases; while, on the other side, the latter rises up behind, and comes into contact with it. The round ligament, also, in most cases, subsequently becomes elongated.

Boinet states, in a general way, that the bladder is almost always behind the cyst, and the uterus is habitually in front. The first statement applies, however, as will be seen, especially to the third stage. He also states that the fundus uteri is inclined *toward* the affected side (p. 95), which applies only, with a few exceptions, to the second stage. Thus far, no portion of the alimentary canal, except the rectum, is implicated.

In some rare instances the cyst does not descend into the pelvis at all, but goes through its first and second stages from the normal position of the ovary upward. In such instances the fundus uteri is at first drawn to the affected side, and the rectum escapes pressure.

Second Stage.—The tumor comes above the brim of the pelvis (Fig. 27), and, unless adhesions have been contracted below, rises almost wholly out of it. The tumor has also acquired a pedicle, and, being quite movable, the patient first discovers it, as a ball perhaps four inches in diameter, not tender on pressure. It now begins to displace the small intestines to the opposite side. The uterus also yields to the pressure from above, and is gradually carried backward from its previous latero-version;

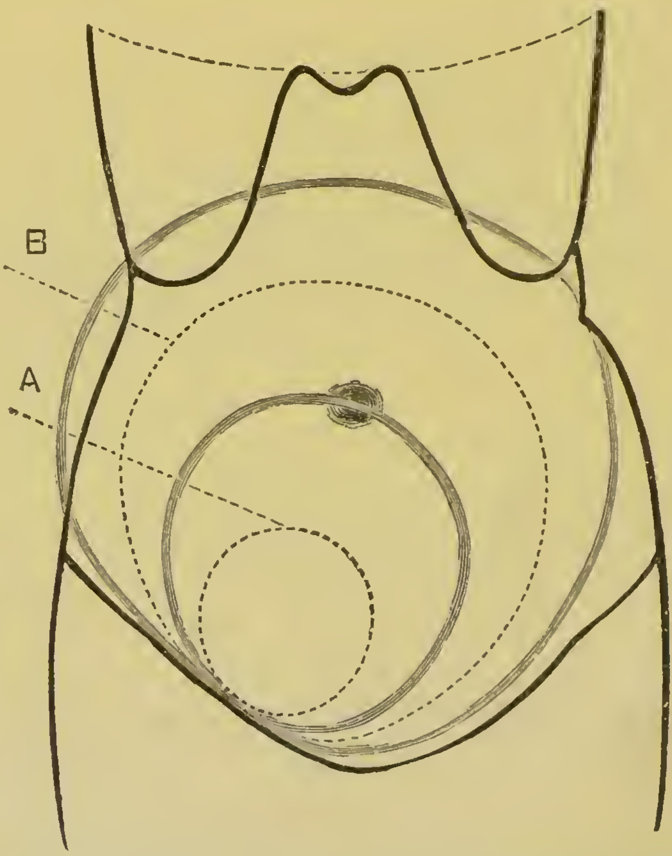

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FIG. 27.—Showing Stages of Growth of ovarian cysts, after the first is completed.—*A*, middle of the second stage, which is shown completed by circle reaching to level of the umbilicus; *B*, middle of third stage, the latter shown completed by the dark circle extending to the epigastrium.

and by the time this stage is completed, and the tumor has reached the level of the umbilicus, or a little below, the uterus is usually placed fairly behind the cyst. The bladder is also carried with the uterus, first to the opposite side (but only after the tumor rises from the pelvis), and then backward; so that when the tumor extends completely across the lower part of the abdomen, and falls downward, being no longer movable laterally, the uterus and the bladder are both behind it, the former being more or less retroverted or retroflexed.

If, however, the cyst had become adherent in the pelvis during the first stage—which is not very rare in case of polycysts—its relations to the bladder and uterus below remain unchanged; i. e., they still remain in front of it, or rather the bladder is pushed to one side, while the uterus may or may not maintain a more central position. This relation of the uterus, at the end of the second and in the third stage, is not very uncommon in case of polycysts, but is very rare with oligocysts. I have, however, met with it in a single instance of monocyst without adhesions.

Boinet mentions the fact as a remarkable one that Cruveilhier found the uterus behind an ovarian cyst in three instances (p. 95). Huguier has remarked that cysts of the left ovary sometimes place themselves on the right side in the second stage, and thus mask their point of origin; a fact attributable, I think, to the normal proximity of the left ovary to the rectum (p. 1).

Third Stage.—The tumor having now risen to the level of the umbilicus (Fig. 27), pushes the small intestines above it, and more into the left than the right hypochondrium, as Boinet asserts (p. 94), the omentum majus alone being interposed between it and the anterior walls of the abdomen, and as far down on its anterior surface as its length will allow. In case of a large tumor, the omentum scarcely extends below the navel. The sigmoid flexure is also pushed behind the cyst; but the ascending and descending colon maintain their normal positions; a fact of very great importance in a diagnostic point of view. The uterus and bladder remain as at the end of the second stage; but the tumor, still expanding upward, at length reaches the stomach, the spleen, and the liver, elevating the ribs and the diaphragm as shown in Fig. 28.

Fourth Stage.—Finally, the tumor increases in the direction of the least resistance, expanding forward and laterally, as before stated (p. 61), but without further change of its relations to the abdominal contents.

If, however, the omentum were adherent at its lower extremity before the growth of the ovarian cyst commenced, it will, of course, cover the whole anterior surface of the tumor, however large, and might therefore be wounded in case of tapping. In one of my cases of ovariotomy, I found the omentum thus adherent to the right iliac fossa.[1] It was of sufficient length to reach, after the removal of the tumor, nearly to the patient's knees.

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[1] *American Journal of Medical Sciences*, July, 1864.

Moreover, if a portion of small intestine should become in a similar manner adherent to the anterior wall of the abdomen, it would remain between the wall and the tumor. I. B. Brown met with such a case, and narrowly avoided wounding the intestine in making the abdominal incision for ovariotomy. Dr. Keith had seen two, and S. Wells six such cases, in 1869.[1] In one of the latter, Dr. Routh, Dr. Hewitt, and others, verified the fact of dulness on percussion over that portion of the abdomen.[2]

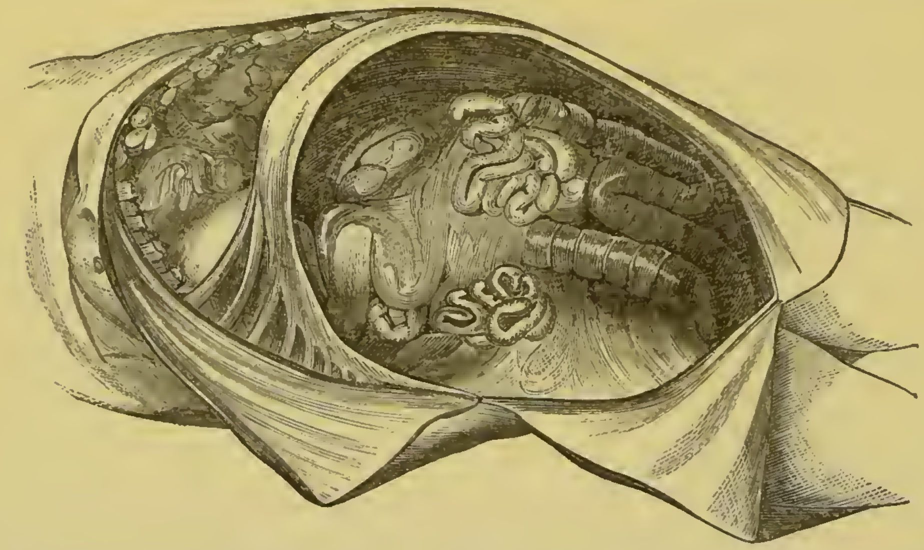

FIG. 28.—DISPLACEMENT OF THE VISCERA by a large ovarian cyst. The liver carries the diaphragm to the level of the third rib. The stomach and intestines, greatly reduced in size, occupy the posterior and upper part of the abdomen, where alone the intestinal movements were felt by the patient. The lungs much compressed, and full inspiration impossible. Ribs much elevated, and vertical dimensions of the thorax proportionally diminished.—(Bright.)

If the cyst become adherent to the posterior wall of the bladder, in the first or the second stage, the latter remains in front of the tumor, and may be punctured in tapping. M. Ritouret reports such an instance.[3]

SECTION III.

CHANGES SPONTANEOUSLY OCCURRING IN OVARIAN CYSTS.

M. Ordoñez has found that a process of production and degeneration is constantly going on among the histological elements of ovarian cysts, and especially in the tufts of capillary vessels on their inner surface (Boinet, p. 84). The lining epithelium is also liable to fatty degeneration. But there are also other changes to be considered, some resulting, in favorable circumstances, even in a spontaneous recovery, while others are always attended with danger:

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[1] *N. Y. Jour. of Med.*, 1869, vol. ix., p. 194. [2] *Med. Times and Gazette*, Jan. 2, 1858.

[3] "Archives Générales de Médecine," 1865, tome i., p. 108.

1. Cases are recorded of the *spontaneous evacuation* of ovarian cysts by absorption. Dr. Baillie mentions an instance of absorption of the contents of a cyst which had existed thirty years.[1] Mr. Norman, of Bath, also had a case of progressive wasting of an ovarian cyst.[2] The fluid did not reaccumulate in either of these instances.

I do not admit, with some writers, the spontaneous absorption of an ovarian cyst, together with its contents. But sometimes a progressive atrophy does occur. Such a case occurred under my observation several years since, during the administration, three times a day, for four or five months, of fl. ℥ ss. of a saturated solution of chlorate of potassa. I am by no means positive that the disappearance of the cyst was due to the remedy used. Prof. White, of Buffalo, has had a case of spontaneous absorption of the fluid.[3]

2. Very rarely, after a period of active increase in an ovarian cyst, the secreting process suddenly, and without any apparent cause, ceases, and sometimes finally. In other instances the disease resumes its former activity. In a case continuing fifty years—from 1809 to 1860—the patient was tapped at long intervals prior to 1825, the first tapping being in 1811, when four gallons of fluid were removed. She was then twenty-seven years old. She gave birth to three living children in the years 1812, 1815, and 1818. From the year 1825 to 1848, she was not tapped at all; i. e., from the age of forty-one to sixty-four. From 1848 to 1860, she was tapped seventeen times, and she died from exhaustion in August, 1860, at the age of seventy-six years.

The following case, reported by Dr. Ritchie,[4] is very remarkable for the tidal growth of the cyst. The patient, thirty-eight years of age, was in a private lunatic asylum, under the care of Dr. Millar, until she died; and Dr. Millar's measurements are shown in the following table:

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[1] Quoted by Dr. Copland.

[2] *Provincial Medical and Surgical Journal*, 1851, p. 7.

[3] *Buffalo Medical and Surgical Journal*, October, 1870, p. 90.

[4] *Edinburgh Medical Journal*, March, 1870, p. 849.

In Circumference.

1867. April,	= 54	inches, maximum.		
1867. 19th May,	= 51	"	— 3	— 16.
1867. 19th September,	= 41	"	— 10	
1867. 19th October,	= 38	"	— 3	
1867. 5th November,	= 40	"	+ 2	+ 11.
1868. 23d February,	= 45	"	+ 5	
1868. 26th June,	= 49	"	+ 4	
1868. 25th July,	= 35	"	— 14, minimum.	
1869. March,	= 45	"	+ 10	+ 16½.
1869. April,	= 47	"	+ 2	
1869. May,	= 48	"	+ 1	
1869. June, 1869. July,	= 50	"	+ 2	
1869. August,	= 51	"	+ 1	
1869. September,	= 51½	"	+ ½	
1869. 23d November,	= 50½	"	*post-mortem* circumference.	

In its obstetrical aspect Dr. Ritchie thought the case was also interesting. The first distinct notice of her true condition was in March, 1866; but long previous to that date her peculiar appearance had attracted notice, and it was not improbable she had been self-conscious of it, as she used frequently to say she was in the "family way." In April, 1867, her condition was one of great urgency, which seems to have been connected with the tumor, and it gave a starting-point as to her size. An interesting point, too, was that her state at this time apparently indicated her first reduction in size; for during the next month she became three inches less, and in September there was a more rapid decrease of ten inches; with the reduction in the following month, there was consequently a decrease, in the course of five months, of sixteen inches; and it was of importance to note that in September, when the rapid decrease took place, the only condition noticed was that she passed immense quantities of water. Had there been any injury to the cyst, some constitutional disturbance would likely have been produced. For eight months she went on increasing in size, till on the 26th of June she had gained the girth of forty-nine inches, or eleven more than in October. The second decrease occurred in July, and was very rapid, amounting to fourteen inches in the course of a month; and from this time till her death, sixteen months after, she steadily gained in size, but never reached the girth when first measured in April, 1867.

This diminution in circumference having occurred twice, might, he remarked, form the subject of considerable speculation, and that various theories to explain it might be advanced. The first point to settle was, whether there were more cysts than one. At first he was inclined to believe that there had been, and that one had ruptured on each of the two occasions alluded to; but, after making a minute examination of the preparation, he could not satisfy himself as to there being any traces of a ruptured cyst; for he considered the cysts must have been of great size when they ruptured, the decrease being in one case sixteen and in the other fourteen inches. He felt satisfied that the small thickened portion of the preparation could not represent a collapsed cyst of the required size. His speculations being limited, therefore, to the existing cyst, he arrived at the conclusion that, although there were numerous traces of rudimentary cysts, one only had developed to great size. The next question which occurred was, How did the fluid escape from the cyst? He could detect no evidence of fistulous opening into the genital tract; and, had there been one into the intestinal canal, it would not have been overlooked by Dr. Millar. After several attempts, a piece of fine whalebone was passed along the right Fallopian tube. Supposing that rupture had occurred, there being no trace of fistulous opening, and only the right Fallopian tube being pervious, the matter was reduced to this: Could a tube of so small a diameter, that an ordinary probe could not be passed along it, and in which there was no evidence of previous dilatation, permit of such a flow of fluid along it as to cause the rapid diminution which took place, especially on the last of the two occasions? His opinion was that it could not. He could see no other way in which it could be removed but by the kidney. He referred to the observations of Sir J. Y. Simpson, Hewitt, and others, on the removal of ovarian fluid from the peritoneal cavity, but remarked that their observations were not applicable to the case before the society, for in it there was no account of such a train of symptoms as accompany the sudden rupture of such a large ovarian cyst, and the extravasation of its contents into the peritoneal cavity, and, what was even more important, there was no trace in the walls of the cyst of rupture having occurred. Dr. Thomas Keith had kindly examined the preparation, and was also of opinion that no rupture had occurred. He had seen several cases of a somewhat similar kind to that of Miss M. O., and had observed decrease of size, and its subsequent increase. The conclusion Dr. Ritchie came to was, that the fluid had been in some way absorbed from the cyst directly, and without the intervention of rupture. In the cases in which Dr. Keith had observed a similar decrease, the fluid, as in Miss M. O.'s case, was clear and thin. Dr. Ritchie thought it was possible, and he might even say probable, that an endosmotic change had taken place by means of the large vessels to which allusion was made among the *post-mortem* appearances. This was favored by the extreme thinness of the posterior wall of the cyst, which was quite transparent, and by the limpid character and low specific gravity of the contained fluid. In such a view, it would be expected that, when the distention of the cyst was greatest, the walls therefore thinnest, and the surrounding blood-vessels most stretched, the transmission of the fluid would most likely commence; and, referring to the case, it would be observed that the decrease in size in the first instance began when the greatest distention had been attained, and the increase began when the reduction had reached sixteen inches. In the second instance, the reduction commenced when the circumference had reached forty-nine inches; and, when the lowest measurement of thirty-five inches was arrived at, the cyst reversed the action, and again filled. It would be instructive to have his view, on the one hand, confirmed, or, on the other, to have a more satisfactory explanation of the phenomena. He had only further to add that he understood Dr. Keith to say he had rarely seen so small a pedicle, and that the case would have been an excellent one for operation.

2. A *spontaneous cure* has also resulted from the bursting of an ovarian cyst into the peritoneal cavity, and the subsequent absorption thence of the fluid, not again secreted. But, in most cases, the fluid reaccumulates, and remains after such an occurrence. Kiwisch, however, speaks of cases in which rupture, followed by reaccumulation two or three times, has finally led to a complete cure. In one instance, the fourth rupture was followed by a cure, they all having occurred within a period of five months (p. 121).

The rupture of the cyst may be caused directly by a blow, or by a general concussion, as from a fall, or may occur from no assignable cause. Sometimes a leakage occurs from the point of a previous tapping, and a cure follows. Dr. Martin Barry reports a case in the *Medical Times and Gazette*, of July 13, 1861, of rupture of an ovarian cyst from a fall, and which wholly shrivelled up in three weeks. An instance has been reported of the rupture of an ovarian cyst during an examination by the surgeon. Inflammation and death ensued (Ibid., 1869, vol. i., p. 446).

Large cysts are less liable to spontaneous rupture than small ones, since their walls have attained to a greater degree of thickness and strength. Ruptures are often closed by the healing processes, and the resulting cicatrices are seen on removing the tumor by ovariotomy. Kœberlé figures such a case in his Plate II., Fig. 4.—("Opérations d'Ovariotomie," Paris, 1865.)

But the escape of the fluid of an ovarian cyst into the peritoneal cavity, in consequence of a rupture of its wall, is only rarely a salutary accident; often the result is fatal. If it be the bland secretion of an oligocyst which has never been tapped nor inflamed, it will pretty certainly not excite a peritonitis, but be rapidly absorbed and carried off by diuresis, or sometimes by a profuse diaphoresis.[1] Boinet states, however,[2] that the contact of the fluid with the peritonæum always produces intense pain, whatever its properties. The cyst will then refill, except in the very rare cases in which a cure results precisely as if it had been tapped. I have had two cases of ruptured cyst which did not refill; but I now believe both of them to have been cysts of the broad ligament. Prof. White, of Buffalo, has had a cure after rupture of the cyst.

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[1] Dr. J. Y. Simpson reports such a case continuing several months. *Edinburgh Monthly Journal of Medical Sciences*, vol. xv., p. 528.

[2] Page 197.

But, if the fluid escaping into the peritonæum be the dense, irritating secretion of a polycyst, it is very sure to produce a peritonitis, which usually proves fatal. And polycysts are far more liable to spontaneous rupture than oligocysts, since their walls are thinner and weaker (p. 50). I have seen five cases of spontaneous rupture of polycysts, and four of the patients died of peritonitis within five days of the accident. The remaining one barely recovered, and the tumor was successfully removed by ovariotomy about a year afterward by Dr. T. A. Emmet, of the New York State Woman's Hospital. Ovariotomists alone seem to be cognizant of the excessively irritating qualities, in some cases, of the fluid of polycysts. Sometimes the hands of the operator, getting bathed by it during the operation, remain red, and retain a tingling sensation for hours afterward. Prof. White, of Buffalo, reports a case in which the contents of a polycyst caused the hands of the operator to feel for twenty-four hours as if they had been immersed in a strong alkaline solution; and some of the fluid, which had been thrown out, chancing to be devoured by some chickens, caused their instantaneous death.[1]

The following interesting observations on this subject have been made by M. Verneuil:[2]

> After an ovariotomy at which I assisted, M. Matthieu, who had supplied the necessary instruments, immediately placed them in water, for the reason, as he stated, that the contents of certain ovarian cysts blackened, altered, and even corroded very rapidly the most polished steel. This fact struck me, and, desiring to verify it, and having some days afterward an opportunity of puncturing an ovarian cyst, I collected in a closed vessel the fluid, which was turbid and of a brown color, and allowed to remain in it several pieces of iron and polished steel. On the following morning these pieces were covered by a pulverulent black layer, so thick that it could not be wholly removed by the most energetic rubbing. The metallic surface had lost its polish.

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[1] *Buffalo Medical and Surgical Journal*, October, 1870, p. 90.

[2] *Gazette Hebdomadaire*, No. 13, 1870.

If the contents of certain ovarian cysts exert a chemical action so evident upon steel, can it not be readily believed that they will act in a like manner upon the peritoneal serous membrane, and may not the same accidents which occur so frequently in consequence of spontaneous rupture of cysts of the ovary into the peritonæum be thus explained?

M. Nepveu has collected a number of cases which, joined to those already reported by Dr. Tilt, of London, furnish a total of ninety-seven cases. Out of this number there were forty-six deaths, and fifty-one cures more or less complete. Sometimes, though rarely, death was sudden; on other occasions it was speedy from subacute peritonitis; most frequently it occurred at the end of a few days.

The nature of the fluid was observed only in twenty-five cases: in eleven it was purulent and caseous; in two gelatinous; in two made up of pus and encephaloid matter; in seven its character was very variable, being serous, red, reddish brown, or black in color, sanguinolent, rich in cholesterine, etc. In four instances there were dermoid cysts, and once the tumor was an hydatid (?) cyst. Unfortunately, in noting these differences, the physical aspect of the diverse fluids was regarded, without any notice having been taken of their chemical properties.

Having thought that experimentation might be of some utility in clearing up so obscure a subject, I advised M. Nepveu to make upon some animals injection with the ovarian fluid.

These experiments, though few in number, have produced some results. Four dogs received into their subcutaneous cellular tissue a few drops of ovarian fluid, injected by the ordinary syringe. In all, the temperature was raised by some tenths of a degree, amounting occasionally to one degree. The number of respirations was increased by one-third. The cardiac pulse, four or five hours after the injection, could not be counted. Other symptoms of greater or less intensity were also manifested; these consisted in loss of appetite, great thirst, great prostration, much barking and nocturnal sweating. The symptoms lasted from two to eight days, and then the general health was reëstablished. On one occasion the injections, although scanty, set up small local subcutaneous abscesses, but the creature experimented upon was a small dog who had suffered with much intensity the symptoms above described.

The ovarian fluid injected in these experiments was of a fairly good character, serous, somewhat thready, and of a very light-brown color. Notwithstanding this apparent benignity, it possessed pyogenic and even (in one case) phlogogenic properties.

The results of these few experiments justify the taking of minute precautions in the operation of ovariotomy, in order to prevent the pouring out of cystic fluid into the peritonæum, and the care with which the cleansing of this serous membrane is carried out; they also supply a fresh proof of the assistance that may be given by experimentation to clinical practice.

3. The walls of ovarian cysts are very liable to be attacked by *inflammation*, all of the results of which are dangerous to the patient. If it be confined to the external layer, it usually, however, merely causes adhesions to the organs in contact with the inflamed serous surface, though it may give rise to a general peritonitis. If the middle layer become inflamed, the ultimate consequences are more serious. An exudation, and not seldom a profuse hæmorrhage also, occurs into the cavity of the cyst; and sometimes it becomes lined by this exudation, which subsequently is supplied with vessels. Fibrinous flakes and often sanguineous clots are formed there; and soon the whole mass of fluid becomes puriform, holding these substances and the exfoliated epithelium-cells in suspension. An absorption of this fluid may produce a rapidly-fatal septicæmia; and softening, or even ulceration may occur in some portion of the cyst-wall, and a perforation at that point be the result. If the discharge be into the peritoneal cavity, the result is usually fatal; for, whether the tumor be an oligocyst or a polycyst, the fluid is rendered so irritating, by the inflammatory products mixed with it, that peritonitis will be the inevitable consequence of its escape. The oligocyst is, however, far less liable to inflammation; and, if inflamed, is less liable to perforation. Inflammation of the middle layer of the wall of the cyst is not evidenced by pain. (Kiwisch, p. 118.)

Fortunately, however, the perforation of the wall of an ovarian cyst as a final result of inflammation does not generally open into the peritoneal cavity. Occurring usually at the part of the cyst where the inflammatory process has been the most intense, that portion has become adherent to the contiguous part or organ before the perforation occurs; the latter often being the immediate result of a slow ulceration at that point. Thus the contents of the cyst may be made to discharge into any portion of the alimentary canal below the diaphragm; into the bladder, the vagina, the Fallopian tube; or externally, through the walls of the abdomen. Examples of all these avenues of escape for the fluid are quoted by Mr. I. B. Brown, in his work on "Ovarian Dropsy," p. 35. If the alimentary canal is selected as the conduit, a perforation into the rectum is the most common; and next in frequency into the colon. But all the routes just mentioned are safer, of course, than the discharge into the peritoneal cavity; and sometimes a cure has been the result of the evacuation of the cyst. Dr. Seymour mentions a case in which the fluid escaped by the vagina and the bowel at the same time, and the patient recovered. And, so far as this accident looks to a cure, perforation into the vagina is the most favorable; and next into the rectum. If the perforation occurs into the small intestine (and sometimes if into the large also), gas may pass through it into the partially-emptied sac, and thus make the diagnosis of the case more difficult. During the last three years I have had a case under observation in which the fluid of an ovarian monocyst has, once in two or three months for the past four years, been discharged through the Fallopian tube, uterus, and vagina. The patient enjoys a comfortable degree of health after each discharge of one to two gallons of the usual bland fluid of a monocyst. Four similar cases have been reported by M. Richard, of Paris. The ovarian cysts "had involved a considerable portion of the Fallopian tube, through which their contents could by pressure be forced into the uterus." A distinctly-formed opening existed between the cyst and the tube. The uterine portion of the tube was not so enlarged as to allow the fluid to pass through it even on the application of pressure, unless a probe was previously introduced. M. Richard believes that some of the cases described as tubal dropsies are really examples of this kind, which he calls tubo-ovarian; and that the course and disappearance of some encysted abdominal tumors may thus be explained.[1]

It has been stated that polycysts are far more liable to perforation than oligocysts; and I should add that dermoid cysts are still more liable than the former. They may also discharge their contents through any of the passages above mentioned; and in this way we explain the expulsion of masses of hair, and perhaps of teeth also (p. 59) by the vagina, the rectum, and through the abdominal walls.[2] Indeed, the tumor itself has, in very rare instances, been discharged *per rectum*.

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[1] *Medico-Chirurgical Review*, 1854, p. 465. For examples of each form of perforation mentioned above, see Boinet, p. 123.

[2] *New York Medical Journal*, September, 1866, p. 473.

Another effect of inflammation is seen in the production of gangrenous patches in the walls of cysts affected by it. Cruveilhier has reported several remarkable examples of it. A similar gangrenous condition is, however, sometimes produced by a very great degree of distention of the cyst.

4. The growth of an ovarian cyst is sometimes also, though very rarely, arrested by a so-called *ossification* of its walls. It is, however, simply a calcification; no true bone being formed.[1] A deposit of carbonate and phosphate of lime is, indeed, not very rare in the walls of ovarian cysts; and, when it occurs throughout, the further development of the tumor is prevented. Cartilaginous masses occur in the walls of cysts, especially in old persons.

5. *Adhesions* of ovarian cysts to contiguous organs, as a result of inflammation of the outer layer of their wall, have already been mentioned (p. 34). But they may doubtless also result from mere prolonged contact, with some degree of pressure. Hence they are frequently found by ovariotomists, and in autopsies, in patients who had never given any signs of an inflammatory process.

The most extensive, firm, and vascular adhesions are, however, the result of inflammation; and in any case in which symptoms of the latter have occurred we may expect them to exist, of course. Polycysts are far more liable to adhesions than oligocysts, as they are more liable to inflammation. Indeed, the tendency to adhesions is one of their distinguishing characteristics.

Ovarian cysts are bound by adhesions most frequently to parts having very little motion, for a very apparent reason. Beginning with the surface most frequently adherent, the different parts and organs may be arranged in the following order: 1. Anterior walls of abdomen (there is a special tendency to adhesion around the site of a previous tapping in case of polycysts—not in monocysts); 2. Omentum majus; 3. Large intestine, especially the rectum, and the transverse colon; 4. Uterus (Fallopian tube, of course); 5. Bladder; 6. Liver; 7. Broad ligament of the opposite side; 8. Spleen; 9. I have seen adhesions to the small intestine but once, though Kœberlé had two cases in his first eleven; to the stomach never, though

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[1] "Cyclopædia of Anatomy and Physiology," Supplement, p. 579.

Kiwisch admits them. Adhesions of the posterior surface of the cyst are much more rare than of the anterior. Adhesions may be removed spontaneously; and a cyst, rendered immovable by them, may become movable again.

6. Still more rare and remarkable than the preceding examples is the *spontaneous twisting of the pedicle* of an ovarian cyst. I have alluded to a case occurring to Klob; and to two others reported by Dr. Van Buren,[1] of New York; and here add one by Dr. James Crane,[2] of Brooklyn. It is a curious fact that in two of these cases the pedicle was twisted once and one-half round, and in one twice round. Three of the cases (Klob's and Van Buren's) were ovarian fibroids, of about the same diameter (larger than the fœtal head); while the other was a polycyst of a somewhat larger size, and was a complication of parturition. The twisting had caused an intense congestion in all three cases; and led in the last (Dr. Crane's) to a fatal peritonitis five days after delivery. Dr. Van Buren performed ovariotomy on both his patients, of whom one recovered, and the other died thirty-nine hours afterward, of peritonitis. In Dr. Crane's case, agonizing pains occurred in the left iliac region twenty-four hours before labor commenced, which probably indicated the time the twisting occurred. The polycyst was of a dark-purple color, almost black, and had several perforations in its walls. From Dr. Van Buren's case of pedicle twisted *twice* round, no symptoms had resulted previous to the operation; and this was the patient who recovered.

7. Very rarely a *sudden hæmorrhage occurs within an ovarian cyst* without any assignable reason. Sometimes, also, the bleeding is produced by twisting of the pedicle as just explained. Dr. R. Barnes has reported two cases of this kind. Dr. J. S. Parry reports a case in the *American Journal of Obstetrics*, for November, 1871, in which the hæmorrhage occurred so suddenly as to produce a collapse which threatened to be fatal. The diameter of the cyst was increased from one to one and a half inch in all directions in the course of a few hours.

8. In rare instances ascites accompanying an ovarian cyst spontaneously disappears.[3]

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[1] *New York Journal of Medicine*, March, 1850, and March, 1851.

[2] *American Medical Monthly*, April, 1861, p. 275.

[3] Kiwisch, p. 197.

9. Lastly, the pedicle of an ovarian cystoma may entirely give way spontaneously, and the tumor may afterward become again attached, and grow in some other part of the abdominal cavity; the rupture of the pedicle occurring while it is still small.

SECTION IV.

THE ORIGIN, CAUSES, AND SYMPTOMS, OF OVARIAN CYSTS.

1. The **origin** of the two forms of cystoma ovarii, as determined histologically, has already been specified. It is, however, proper here to give a *résumé* of the most authoritative opinions, up to the present time, on this subject, and on the origin of the dermoid cyst.

Since cysts are more common in the ovary than in any other organ (Dr. Farre), and its only peculiar anatomical element is the ovisac, it is quite natural to infer that all forms of ovarian cysts originate from the latter. This idea has been adopted by Scanzoni, Velpeau, Cruveilhier, Negrier, Hertz, Huguier, Boinet, Paget,[1] Farre, Hodgkin, and others. Boinet maintains that the physiological phenomena of ovulation perfectly explain this origin of ovarian cysts, although the histological reasons from analogy and induction do not support this idea.

Kiwisch,[2] in explaining the origin of ovarian cysts, cites three entirely different views:

1. They result from an alteration and a dilatation of ovisacs.

2. They arise from a new formation in a pathological blastema, by endogenous multiplication of cells or nuclei.

3. They proceed from a new formation in a pathological blastema, and originally present the form of vesicles.

But the fact that cysts occur in other organs, as the kidneys, which do not contain ovisacs, and which contain no tissue common to them and the ovary, but the connective tissue, equally suggests that they may sometimes also originate from the latter; and Wedl regards them as due to excessive augmentation of the areolæ of the connective tissue. Rokitansky derives them from an "elementary granule, which grows, by intussusception, into a nucleus, and then into a structureless vesicle;" the source of the granule not being specified.

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[1] "Lectures on Tumors," 1858.

[2] *Op. cit.*, p. 100.

Dr. Farre argues, in defence of the hypothesis that all ovarian cysts originate from ovisacs, that "the occurrence of these cystic formations is limited to that period of life when the Graafian follicle is in a state of activity;" and adds that "they are not found as new formations after the usual time at which the follicles have ceased to be discoverable in the ovaries, as natural structures, nor do they occur before the period of puberty has arrived, except in cases much more rare than those of an unusually early development of these follicles, or of precocious puberty."[1]

Though it is presumable that the nutrition of the other structural elements of the ovary, as well as of the ovisacs, is modified during menstrual life, this argument has some force so far as the oligocyst is concerned, and accords with the view I have already adopted on histological grounds (p. 44). But it applies to the oligocyst alone. Polycysts do occur as late as fifty and even over sixty years, as new formations, and rarely also before puberty, thus suggesting an origin not from ovisacs; and on histological grounds they have been shown to be developed from the ovarian stroma, as Wedl had asserted of ovarian cysts in general, though he assigned to them a different method of development from that source. Kiwisch maintains that, when a cyst is solid at its base, this is due to the fact that it was developed from follicles deep in the ovary.

The origin of the two forms of cystoma ovarii may, therefore, I think, be regarded as established. The oligocyst commences as a dropsy of the ovisacs, and may practically be considered simply as a larger development of the hydrops folliculi, and the polycyst as a colloid degeneration of the ovarian stroma. Dr. Wegscheider has reported a case of colloid of the left ovary in a girl twelve years of age,[2] and I have already quoted instances of polycysts in the new-born. But the origin of the dermoid cyst remains still unexplained.

Two hypotheses have been proposed by Cruveilhier:

1. That dermoid cysts are the remains of an extra-uterine (ovarian) conception.

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[1] "Cyclopædia of Anatomy and Physiology," Supplement, p. 590.

[2] "Beitrage zu Geburtshülfe und Gynaekologie," 1 Band, 1 Heft.

2. That they are developed in consequence of a *fœtus in fœtu.*

1. The first dermoid ovarian cyst, ever removed from the living subject, was removed successfully by Dr. E. McDowell, of Kentucky, in May, 1819, and I quote his argument[1] in opposition to the theory first mentioned above, as quite conclusive for that case. "One or two of the physicians present" (at the operation) "were inclined to believe that the disease originated from an extra-uterine conception; and that all of the fœtus had been absorbed, save the hair and single bone, which were found. This question I submit to the faculty. As for myself, I think it as reasonable to suppose the hair and bone in this unnatural situation were the result of a morbid action. She had been delivered of a child two years before the operation; her health during that time was never good, but she had no reason to believe herself pregnant; and, if it were the case, I doubt whether a whole fœtus could be so nearly absorbed in two years."

But we have also seen that dermoid cysts are very frequently developed before puberty; that they are sometimes developed before birth even; and that they are found in the male as well as the female. The idea must, then, be dismissed that they are a consequence of conception on the part of the patient herself.

2. The other hypothesis appears, at first sight, more plausible; and Boinet, who adopts it, terms dermoid cysts "kystes fœtaux par inclusion." The supposition is, that, two ova having been fecundated at the same time in the patient's mother, the one during its development enclosed the other, so that the development of the latter was arrested, and only hair, with teeth and bones, perhaps, was formed. This theory implies, of course, that dermoid cysts are always congenital.

If this view be correct, we have still to inquire why the enclosed fœtus should be found in the female so much more frequently than in the male, and in the ovary rather than in any other part of her body; for three-fifths of all dermoid cysts are ovarian (one hundred and twenty-nine out of one hundred and eighty-eight cases). The latter question is answered by Boinet, by the assertion that "the plastic activity is greater in that gland than in other parts (p. 119). But we must remember that we are now considering an event of fœtal life, and where no such activity, as is alleged, is known or suspected to exist. They also sometimes actually occur in other organs, even in the lungs of females (Ploetta). Can we believe that an included ovum determines the sex to be female, in three-fifths of all the cases, in the including embryo? On the other hand, nearly two-fifths of all dermoid tumors are found in the male, and the majority of them in the testis.

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[1] *Eclectic Repertory*, vol. ix., p. 552.

If, therefore, we consider (1) that the (alleged) enclosed ovum is so generally found either in the ovary or the testis, while in exceptional cases it occurs in the subcutaneous connective tissue, the brain, the lung, the anterior mediastinum, the stomach,[1] the kidney, the bladder, the scrotum, and behind the peritonæum upon the posterior muscular walls of the abdomen,[2] and that (2) the development never advances beyond the limits which have been specified [3]—we find this hypothesis scarcely less unsatisfactory than the preceding.

Lebert suggests a spontaneous generation of skin from the elements present in the organ affected, which existing, the other tissues are produced by it. But spontaneity is not a recognized force in tissue-development; nor does skin produce bone, teeth, muscular tissue or nerves. It is itself, like all these, produced from a preëxisting structure.

If a portion of skin anatomically perfect, however small, be developed within any part or organ, we may assume that it will in time produce successive growths of hair, throw off successive layers of epithelial cells (and possibly nails also), and secrete the sebaceous fluid, for this is the fact respecting the skin on every part of the body, except that, where hairs would interfere with a function, they are not found.[1] These products would also fill the cavity, the parietes of which the skin wholly or in part constitutes. If the skin originally constituted the whole cyst, it might continue to do so, or, if the products of its surface should demand a more rapid increase of the cavity than the growth of the skin could afford, the latter would at length occupy only a part of the internal surface.

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[1] Dermoid cysts have also been found in the lower animals. Prof. Coleman found a cyst in the abdomen of a gelding, to the interior of which two molar teeth of a horse, of regular development, were attached. One incisor was also attached to a portion of bone resembling the jaw. There was also a quantity of fat, and some black hair in another cyst.—(T. S. Lee, p. 136.)

[2] T. Safford Lee, *op. cit.*, pp. 136, 137. Also J. F. Meckel, "Memoirs sur les Poils et les Dents qui se développent accidentellement dans le corps."—"Journ. compl. du Dict. des Sciences Méd.," tome iv., pp. 122 et 217.

[3] The case reported to the Medical Society of Paris, by Dupuytren, of a tumor from the abdomen of a boy, containing a mass of hair and a fœtus nearly ossified, must now be accepted with some degree of allowance; and the same remark applies to Mr. G. W. Young's case of a fœtus distinctly recognized in a cyst in the abdomen of a boy (John Hare), one and a half year old.—("Medico-Chirurgical Transactions," vol. i., p. 236.)

But whence are the bones, cartilage, muscular tissue, and nerves, to be derived? The reply to this question shows, not only that all dermoid cysts are congenital, but that their origin must be referred to a very early period of embryonic life. Hairs appear on the surface of the fœtus, about the middle of the period of gestation, and the sebaceous secretion begins to accumulate at the sixth month; hence we cannot expect that these substances can be produced in a cyst before birth, except possibly in exceedingly minute quantity. But the formation of the skin in the cyst must be referred back to the period when the skin is formed elsewhere, and it must be derived from the same developmental source.

The external layer of the blastodermic membrane of the embryo is the source of the skin, and all the organs of animal life (the osseous, muscular, and nervous systems), while the internal layer is the source of the organs of vegetative life. There is, however, a middle portion of this membrane—the so-called "mittelplan" of Remak—whence originate both the Wolffian canals, and the germinating epithelium which forms the ovary or the testis, as has before been stated (p. 13).

If, therefore, there be a displacement of a minute portion of the outer layer of the blastodermic membrane, so that it enters, by invagination or otherwise, into another part or organ, a dermoid cyst containing merely skin and its products, or skin together with any or all the tissues of animal life, will be the result, though these histological elements cannot be expected to assume a definite anatomical form. And such a displacement might occur in any portion of the embryonic mass, and any part of the body may, as has been seen, contain a dermoid cyst.

But the very interesting fact has been stated that these cysts are developed mostly, and almost equally, in the ovary and the testis. For, though the proportion for these two organs is as three to two, according to our present statistics (rejecting the very few cases in which the cysts occur in other parts), it is not improbable that it might be reversed in an equal number of additional cases. At least, the law of development does not determine the cyst to the ovary essentially more than to the testis, but does determine to both very nearly alike, rather than to other parts and organs.

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[1] Peaslee's "Histology," p. 260.

And herein is found still another confirmation of the suggestion that the dermoid cyst originates very early in embryonic life; and certainly before it is determinable by the anatomist whether the organ affected is to be an ovary or a testis. And, since this distinction can be made at about the twelfth week, we must again refer the origin of the cyst back to the first changes in the blastodermic membrane. We have seen that the displacement of its outer layer may project, so to speak, into the stomach, or the bladder, though these organs are derived entirely from the inner layer of that membrane. Does it occur most frequently of all in the ovary, or the testis, because they originate from cells in an intermediate position, and are therefore more liable to take with them some from the external layer? And precisely how is the displacement effected? We must wait for the embryologist to answer these questions.

2. **Causes of Ovarian Tumors.**—Of the causes of ovarian tumors nothing positive is known. Those, however, which produce the dermoid cyst certainly act at a very early period of embryonic life, and are not avoidable, therefore, by practical interference. But we will consider those agencies which may be regarded as the most efficient in causing the two forms of cystoma ovarii—the oligocyst and the polycyst:

A. *Exciting Causes.*—Scanzoni maintains that the immediate cause of the increase of fluid in the ovisacs is an hyperæmia of the ovary; but, inasmuch as this increase would naturally cause the ovisac to burst, he also invokes an hypertrophy of the wall of the ovisac, produced by the same hyperæmia. Kiwisch accepts oöphoritis as an exciting cause (p. 110).

But there is ovarian hyperæmia at each menstrual epoch. Besides, if simple overplus of blood causes ovarian tumors, ovarian congestion and oöphoritis should be followed by their development as a discoverable rule, and not, as is the fact, as a very rare exception. Moreover, the left ovary should be affected more frequently than the right, since, from the anatomical relations of the left ovarian vein, that organ is more liable to hyperæmia than the right, and is, in fact, far more liable, as I can positively assert, to oöphoritis. But the right ovary is, according to some statistics, more liable to cystic degeneration than the left. Of eight hundred and fifty cases examined by Dr. Charles Clay, two-thirds were of the right side, one third on the left. Of four hundred and fifteen cases observed by Cheveau, West, T. S. Lee, and Scanzoni, the right ovary alone was affected in two hundred and one instances, the left alone in one hundred and forty-eight, and both ovaries in sixty-six cases. These observations were, however, made during life, and it is impossible generally to decide, before opening the abdomen, on which side an ovarian cyst originates, though it is more likely to cross from the left to the right side, than the reverse. In seventy-six cases observed after death, twenty-six were on the right side, twenty-three on the left, and twenty-seven were on both sides; i. e., there was disease of the right ovary in fifty-two cases, and of the left in forty-nine cases. It is sufficient for my present purpose to show that the left ovary is not more liable to cystic disease than the right; and I infer there is actually very little difference in the two sides in this respect.

On the other hand, it must be admitted that exceptional cases occur in which ovarian cysts are developed soon after some derangement of menstruation, or after an attack of pain referable to the ovary, and probably due to congestion or inflammation of that organ.

Marriage has been assumed, in some instances, by patients themselves, as an exciting cause of cystic disease of the ovary. T. S. Lee also admits this proposition, while Dr. Charles Clay asserts that the number of ovarian cysts in the married and single is about equal. We must conclude, however, that neither this nor the condition before mentioned can become an exciting cause of the disease in question, except when some predisposing cause has preceded their action.

Dr. John Rose believes in the hereditary nature of the disease, and cites, to that effect, the instance of two sisters who had ovarian dropsy; their mother's sister was also similarly affected. Dr. Lever, in support of the same view, also gives an account[1] of seven deaths in one family from ovarian disease.

B. *Predisposing Causes.*—The scrofulous diathesis, chlorosis, parturition, and excessive menstruation, marriage, and sterility, have been mentioned as the principal predisposing causes of cystoma of the ovary. T. Safford Lee concludes, from an analysis of thirty-six cases, of which he was quite positive of the cause, that the effects of labor are the most frequent cause (fourteen cases); next, the sudden suppression of the menses (seven cases); next, the excitement of marriage. He also thinks that disappointed affection is one of the most fertile causes in the unmarried. Boinet maintains that disappointed sexual desire is the most active predisposing cause. Dr. Charles Clay thinks that the two extremes of menstruation are the most productive causes of cyst-formation; suppression being the more active of the two.

It is very doubtful whether marriage is to be arranged among the active predisposing causes of ovarian cystoma; for statistics do not show any notable difference as to its occurrence in the married or single, except what may be referred to the fact that the disease is most common after the age at which the majority of women marry. But the fact of a woman's having had children or not is, I think, a very important one in this connection. Yet authors here also disagree as to the facts: for, while Dr. Churchill believes that those who have borne children are more obnoxious to cystoma, I. B. Brown finds that the larger number of married patients have not had children, and my own observations fully accord with his.

For me, the non-parturient condition is the most active of all the predisposing causes of cystoma ovarii, after the first ten years of menstrual life have elapsed; since it has not yet developed its effects in young virgins. I apply this remark more especially to the oligocyst, and I do not recognize a distinction in this respect between unmarried women, on the one hand, and the married, who have proved to be sterile, on the other.

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[1] "Guy's Hospital Reports," vol. i., 1855, p. 79.

The simple fact that the woman has never conceived, and gone through a period of gestation, she being twenty-five years of age and upward, I accept as a predisposing cause of cystoma. Whether the sexual desires have been satisfied or not appears to exert a far less important influence; for the married woman, provided she be sterile, seems as much predisposed to cystoma of the ovary as the unmarried after twenty-five years. Sexual desire exists in the mind of the patient, and is a matter of consciousness; but the physiological necessity of completing the cycle of reproduction (ovulation, conception, gestation, and parturition) is an element of the very nature and constitution of woman. And, while the former may be gratified naturally, or unnaturally, or not at all, without much apparent effect on the ovaries alone, disregard of the latter requirement, for a course of years, predisposes to the disease in question. Thus, of five hundred women who had ovarian cysts, Boinet found three hundred and ninety had never had children (p. 72). He also quotes a veterinary surgeon, M. Carlier, as having made the important observation that cows which do not have calves have ovarian cysts.[1] It is, then, the non-gratification of the instinct for procreation, and not the disappointment of mere sexual desire, nor of affection, which determines the result in these cases. On the other hand, the existence of cystoma has no apparent effect in preventing ovulation and gestation, so long as only one ovary is diseased, except that a single ovary is, of course, less effectual than two. Pregnancy is not very seldom a complication of cystoma; and Dr. Ashwell cites the case of a young girl, who had had ovarian cystoma for two years, and who then married, contrary to his advice, and afterward had several children, without any inconvenience from the cyst. Dr. A. B. Crosby successfully performed ovariotomy on a woman who had given birth to three children since the tumor first appeared.[2]

It has been assumed that parturition tends to produce ovarian affections, and cystic degeneration with the rest, as if the ovaries were directly interested in that function, and incur from it increased excitation. It were a far more plausible assumption that *gestation* is a predisposing cause of cystoma, since that process continues for several months, while parturition only lasts for several hours, and does not directly concern the ovaries at all. But during gestation, also, there is a complete inactivity and repose of the ovaries. Their special function is ovulation, repeated every month. But this function is completely suspended during gestation ; and, not only so, but during lactation, which continues, or should continue, about a year ; except that ovulation and menstruation often occur at six weeks, and again at seven months, after parturition. Thus, for a period of twenty-one months, from conception to the end of the child's first year, the ovaries enjoy an almost undisturbed rest and repose. And the woman who has had and nourished six children, has had over ten years of ovarian repose out of the thirty years of ovarian activity, which she who passes through life childless must incur. Thus, it is the continuous ovarian activity of the never parturient, and not the uterine activity with ovarian rest, of the parturient, which becomes one of the most efficient of the predisposing causes of ovarian cystoma. After the menopause even, its effects may be felt ; though the fact that polycysts are then very much more common suggests the action of other causes also in greater activity.

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[1] It is also added that they at all times admit the approaches of the male.

[2] *American Journal of Medical Sciences*, July, 1870, p. 287.

3. **Symptoms of Ovarian Tumors.**—The rational symptoms of ovarian tumors will especially be considered here ; the physical signs being reserved for the chapter on Diagnosis.

A very great difference is manifested, in regard to the tolerance of ovarian tumors, by different patients. In a few cases, there is *malaise* or even decided suffering from the beginning, and early impairment of the general health ; in others, and usually, no special inconvenience is experienced till the general health suffers from interference with respiration and digestion, due to pressure upon the stomach and the diaphragm. And we meet with all grades between these two extremes.

My own observation does not confirm the statement of Mr. I. Baker Brown that ovarian cysts, as a rule, are ushered in by the occurrence of pain (p. 28), though it is less in those who have borne children than in others. I have seen but a single instance in which the patient's attention was called to any decided painful sensation in connection with the early development of an ovarian cyst ; and in this case the patient had borne children. Usually, I should say, no pain is experienced during the early stage which is referable to the organ affected, unless symptoms of peritonitis have also existed.

Very rarely, moreover, is the tumor at first, or at any subsequent period, tender on pressure,[1] unless evident inflammation exists—an important point in the diagnosis of ovarian tumors. In the exceptional case just mentioned, however, the tenderness on pressure was very great; while the incessant pain could only be controlled by large hypodermic injections of Magendie's solution. At length, indeed, the suffering became so intolerable that the tumor was removed, though still no larger than the fœtal head, by Dr. Noeggerath, of this city, with whom I saw the case in consultation.

I shall, under this head, also recognize the four stages of development of ovarian tumors, which have already been specified (pp. 67–69):

1. Generally the tumor at first, and while lying on the floor of the pelvis, produces irritability of the bladder at least, and sometimes difficult menstruation. Not seldom dysmenorrhœa also results from displacement of the uterus. Both these symptoms are generally absent after the tumor ascends from the pelvis into the abdomen above. But, in case of polycysts, the symptoms may continue, since the lower extremity of this kind of cyst more commonly remains in the pelvis, from its lobular form, or from adhesions as already explained.

Constipation is a frequent accompaniment of ovarian tumors during the early stage, and may persist during their subsequent development. Hæmorrhoids are also with polycysts the rule, and, in case of oligocysts, a common exception.

I have not observed, as some writers have remarked, that the menses, though regular, are generally profuse while the tumor rests in the pelvis. Certainly their regularity is seldom interfered with until the tumor has already attained to a size sufficient to decidedly impair the general health.

It is also in this first stage of an ovarian tumor that some of the symptoms of early pregnancy sometimes, though very rarely, appear. The breasts may become enlarged and tender, presenting a well-developed areola round the nipple; there may be suffering from morning-sickness; and, after a considerable development of the breasts, a milky fluid is sometimes secreted. There is also a feeling of weight and fulness in the pelvis. If amenorrhœa exists with these symptoms, the suspicion of pregnancy is, of course, increased; and only a physical exploration can demonstrate the true state of the case.

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[1] But a merely prolapsed ovary is tender on pressure.

2. When the tumor rises above the pelvis—the patient now first detecting its presence—a new train of symptoms is inaugurated. Frequent micturition is very common from pressure forward upon the bladder; and, until the tumor rises above the umbilicus, one side of the abdomen is seen to be fuller than the other, though the tumor can by pressure usually be moved to the opposite side. Now also diminished action of the kidneys results as the tumor presses indirectly upon them and the ureters. Pain in the iliac regions or the back occurs from tension of the Fallopian tubes and the broad ligaments. Suppression of the menses is rare till after the commencement of the third stage. But a feeling of fulness and a dragging pain in the back is very common.

3. Still extending upward toward the epigastrium, the tumor at last presses upon the stomach and other portions of the alimentary canal, the diaphragm, and the heart—thus interfering with digestion and respiration,[1] and producing palpitation. And now, if not before, the general health rapidly fails. The kidneys are congested from pressure, and derangement of menstruation supervenes in this stage. Emaciation, at first of the face, neck, and upper extremities, becomes decided; a peculiar expression of countenance is seen; the menses cease; slight efforts produce dyspnœa; the enlarged abdomen is symmetrical on the two sides; the cutaneous veins of the abdomen are enlarged, and often the lower extremities (at least that of the affected side) are œdematous, though even a large tumor may not produce œdema if there be no adhesions in the pelvis, while a small one often produces this effect if such adhesions exist. Ascites also more rarely supervenes, and sometimes entire retention of urine ensues.

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[1] It is an interesting fact that dyspnœa from an ovarian cyst does not produce tuberculosis; and that anæmia thus caused does not produce disease with fibrinous exudations (Kiwisch, p. 41).

4. Finally, the constant and increasing pressure produces irritability of the stomach and bowels, and exhausting vomiting and diarrhœa ensue; the emaciation becomes extreme, and the dyspnœa wearisome; the heart's action irregular, then weak and rapid; and hectic fever and the aphthous tongue forebode the closing scene. A pulse of 120 to 130 is not uncommon, however, for weeks before death, and while tapping or even ovariotomy might be resorted to. Relief by tapping sometimes reduces the pulse almost at once from 120 or more to 80.

The symptoms are not, however, in all patients determined by the size and stage of development of the tumor. They are more decided and sooner appear in cases of polycystic than of oligocystic tumors; and a tumor scarcely ascending to the umbilicus may produce in one the derangement of general health, which in most cases is deferred to the third stage as just defined. This individual idiosyncrasy must be borne in mind; for thus it is seen that the mere size of a tumor cannot determine the time for surgical interference. It very rarely occurs that this is demanded by the symptoms till the tumor has attained to the third stage; though ovariotomy is not seldom performed in the second stage, and in a very few cases proportionately it is actually required.

Not very seldom attacks of pain, with tenderness on pressure, occur in some portion of the tumor during the second and third stage of development, accompanied by some degree of febrile reaction. This usually indicates inflammation at that point, and adhesions are a frequent result. Here, again, we remark the much greater frequency of inflammation and of adhesions in polycystic tumors. Adhesions, however, are often found to exist, though no such symptoms have preceded.

LEEDS SCHOOL OF MEDICINE

CHAPTER IV.

COMPLICATIONS WITH OVARIAN CYSTS, AND OTHER ENLARGEMENTS OFTEN MISTAKEN FOR THEM.

SECTION I.

COMPLICATIONS WITH OVARIAN CYSTS.

The most important complications occurring under this head are:

I. Pregnancy.
II. Ascites.
III. Uterine Fibroma.
IV. A Second Ovarian Cyst.

I. **Pregnancy with Ovarian Cyst.**—Since the existence of an ovarian tumor does not entail sterility, so long as the other ovary retains its normal condition (p. 89), the coexistence of pregnancy with ovarian cyst is not very uncommon. It is important not to ignore this fact, since the operation of ovariotomy has in several instances been performed on a pregnant patient by an unsuspecting operator. On the other hand, contingencies may possibly arise which call for the removal of the cyst in case of a patient known to be pregnant, and which will be alluded to on a subsequent page.

It is of importance also to know that ovariotomy, though performed on a patient not known to be pregnant, has in several instances proved successful; while in other cases it has induced premature delivery, as would be always expected. Dr. F. Bird reports a case in which there "were no signs of pregnancy." The tumor removed weighed fifty pounds. The patient aborted two days afterward, but recovered from the operation, and subsequently gave birth to a child.[1]

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[1] "Medico-Chirurgical Transactions," vol. xxx.

Dr. Marion Sims operated successfully on a patient four months advanced in pregnancy. She was delivered of a living child at the end of the full term. One of Dr. W. L. Atlee's operations of ovariotomy (No. 220) was performed on a woman two months pregnant. No miscarriage ensued, nor any bad symptoms; and the patient gave birth to a perfect female child seven months after, though the sound had also been passed two and a half inches into the uterus on the day of the operation. The cyst removed contained four gallons of thick, opaque fluid.[1] T. S. Wells performed ovariotomy successfully in the fourth month of pregnancy, after spontaneous rupture of the cyst and peritonitis. Gestation proceeded to the natural close.

The prognosis in case of pregnancy complicated with ovarian tumor is of great importance. Dr. Braxton Hicks speaks of eight pregnancies thus complicated, in none of which any dangerous symptoms arose, and in all of which the patients were delivered of live children at full term. Dr. Playfair collected fifty-seven cases of this kind, of which thirteen had proved fatal to the mother. In seven cases the cyst had been punctured, and in each instance the patient did well. Many fatal cases have, however, been reported, and, among the very recent ones, two by Dr. T. D. Camden.[2]

Fifteen cases of pregnancy complicated with ovarian tumor had, two years since, fallen under T. S. Wells's own observation. The facts, and his conclusions, are briefly stated as follows:[3]

> In three cases sudden death followed spontaneous rupture of the cyst in or before the seventh month of pregnancy. In two cases pregnancy and ovarian disease went on together without interference, and lingering labors ended in the birth of still-born children. In one case twins were born alive, but the mother had suffered greatly from distention. In one case five, and in another six, pregnancies had gone on, and ended normally without interference, but in the last case the cyst ruptured spontaneously in the seventh pregnancy. Five patients were tapped during pregnancy: one, twice; one, three times; and three, once each. In all, five living children were born after natural labors. In one of them, ovariotomy was

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[1] *American Journal of Medical Sciences*, July, 1871, p. 129.

[2] *Medical and Surgical Reporter* (Philadelphia), May 20, 1871.

[3] *British Medical Journal*, December 18, 1869, p. 669.

successfully performed four months after delivery. In one case, ovariotomy was performed in the fifth month of pregnancy; the uterus was emptied at the same time, and the patient recovered. In the concluding case of the series, ovariotomy was performed successfully in the fourth month of pregnancy, after spontaneous rupture of the cyst and peritonitis, pregnancy proceeding without interruption. The author believed that a careful consideration of these cases would lead to the following conclusions: 1. Pregnancy and ovarian disease might go on together, and end safely to mother and child; 2. But, in a large proportion of cases, probably in all where the ovarian tumor was large, there was danger of abortion; or, if pregnancy proceeded to the full term, of lingering labor, and a still-born child; and throughout the later months of pregnancy there was danger of sudden death to the mother, from rupture of the cyst, or rotation of its pedicle; 3. Spontaneous premature labor might not save the mother from these perils; and the induction of premature labor almost implied sacrifice of the child, with considerable risk to the mother; 4. There was no proof that tapping an ovarian cyst was more dangerous during pregnancy than at any other time. It would generally afford immediate relief to distention, and lead to the normal termination of pregnancy in the birth of a living child, at a very slight risk to the mother, if proper precautions were taken to prevent the escape of ovarian fluid into the peritoneal cavity, and the entrance of air into this cavity, and into the cavity of the cyst; 5. If an ovarian cyst should burst during pregnancy, removal of the cyst, and complete cleansing of the peritoneal cavity, might save the life of the mother, and pregnancy might go on to the full term; 6. Of three cases on record where a pregnant uterus had been punctured during ovariotomy, the only recovery was in the one case where the uterus was emptied before the completion of the operation.

The size of the ovarian cyst seems to be of very little importance, viewed in its relation to conception; since in the preceding cases the tumor was large enough to require surgical interference, though the patient was only two to four months pregnant. Not rarely "a marked increase, or even an inflammatory irritation, of the ovarian cyst, takes place after delivery" (Kiwisch, p. 125).

II. **Ascites with Ovarian Cyst.**—Ascites as a complication with ovarian cysts may be the effect of various causes:

1. In case of an oligocyst, it may be due to the development, within a cyst or cysts, of the hypertrophied folds or processes, as explained on page 46, and a subsequent rupture of the cyst and protrusion of the processes, so that the peritoneal cavity contains both their accumulated secretions, and an increased

secretion of its own. Dr. Atlee's case, No. 221, is an instance of this kind.[1]

2. In case of a polycyst the escape of the fluid into the peritoneal cavity will very surely produce peritonitis at least (p. 75); and, if it do not prove fatal, the cyst-fluid, together with the products of the peritonitis, will remain there as if a mere ascitic accumulation, as in the preceding case.

3. But a simple ascites may also coexist with an ovarian cyst without rupture of the latter; in case of cancerous disease of the ovary, or of organic disease of the heart, or of the liver, or, above all, of the kidneys; since even Bright's disease is sometimes produced by the pressure of the cyst upon the kidneys.

The coexistence, therefore, of ascites with an ovarian cyst, small or larger, does not demonstrate carcinoma of that organ, nor any organic affection elsewhere. But it is always a complication of high practical interest, and must be ascribed, if possible, to its actual cause, in each instance in which it occurs. It frequently produces a protrusion at the umbilicus like a hernia; and a flaccid state of the latter, or a very slight fluctuation in it, indicates that the umbilical ring is opened only in a slight degree.

III. **Uterine Fibroma with Ovarian Cyst.**—This complication is not by any means common; but I have met with it several times. Two tumors are perceived, and, unless the fibroid is subperitoneal and pediculated, it is not usually difficult to detect it, by the use especially of the uterine sound. It is sufficient, therefore, merely to record the existence of such a complication. The last case of this kind which has occurred to me, I saw in consultation with Dr. Emmet, at the New York State Woman's Hospital. The diagnosis was very positively pronounced, and subsequently verified by him as an ovariotomist. The fibroma, having extensive attachments to the uterus, was not interfered with. The patient did not recover.

Ascites may also be superadded to the complication just mentioned; and it may be necessary to remove the fluid from the peritoneal cavity by tapping before the actual state of things is revealed.

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[1] *American Journal of Medical Sciences*, July, 1871, p. 130.

IV. Cases of Duplicate Ovarian Cysts.—The oligocyst has been said to be more likely to attack both ovaries than the polycyst, though I have myself not seen this assertion confirmed. But, whatever the form of cystoma, the two cysts are almost always in different stages of development. Hence, on removing a large cyst by ovariotomy, the operation should never be regarded as finished until the remaining ovary is carefully examined, to ascertain whether or not cystic degeneration has already commenced in that also. Seldom, however, is the other ovary found to be larger than a pigeon's or a hen's egg, at the time when the first affected demands surgical interference. But, in a case of double ovariotomy successfully performed by me in 1862, I found the larger tumor as large as a gallon, and the smaller of the size of a quart measure.[1] M. Vidal presented a case to the Anatomical Society of Paris in 1852, in which the cysts of the two ovaries were of the same volume, both being also multilocular, and each tumor enclosing fluids of different kinds.[2] The idea that either ovary is more liable to cystic degeneration than the other is not sustained by statistics, they preponderating sometimes in favor of the right and sometimes of the left; and we may infer, therefore, that one ovary is as liable to this disease as the other (p. 87).

I have seen no record of any case of double ovarian cyst in which the fact had been detected before opening the abdominal cavity. This would indeed be impossible if one of the cysts were very small: and, in the case reported by myself, the two cysts were so packed in the abdominal cavity as to appear a large oligocyst, neither being perceptibly movable on the other.

Various other tumors, as the hepatic, splenic, and mesenteric, may also coexist with ovarian cysts. In one of my cases of ovariotomy I encountered a carcinoma involving the whole of the omentum. If the ovarian cyst has attained to the end of the third stage, it is scarcely possible to detect these complications before opening the abdominal cavity; whether in the operation of ovariotomy, or in a *post-mortem* examination.

[1] *American Journal of Medical Sciences*, April, 1863, p. 355.

[2] Boinet, p. 97.

SECTION II.

OTHER CYSTS OFTEN MISTAKEN FOR OVARIAN CYSTS.

Under this head the following demand especial consideration:

I. Cysts of the Broad Ligament.
II. Hydrosalpinx (Dropsy of Fallopian Tube).
III. Uterine Fibro-cystoma.

I. **Cysts of the Broad Ligament.**—Very little that is satisfactory to the ovariotomist can be learned from the treatises on pathological anatomy respecting the large serous cyst of the broad ligament.

1. The small cyst found in this locality, first mentioned by Velpeau,[1] is described by Rokitansky, Klob, and others, as a serous cyst sometimes barely visible, and seldom larger than a cherry, though possibly as large as the fist. It contains a clear, pale-yellowish, serous fluid, and seldom projects equally on both sides of the broad ligament; but usually most anteriorly. It is generally thin-walled, and is lined by a cylinder epithelium. M. Houël states that these cysts are almost always sessile in children, and pediculated in adults; though, according to Rokitansky, the larger are less likely to be found pediculated than the small ones. The pedicle giving way, the cyst may be developed in another portion of the abdominal cavity. At least, Boinet believes this to be the history of a small cyst found free in the abdominal cavity by M. Luys, and presented by him to the Anatomical Society of Paris (p. 106). In respect to the origin of these cysts, Rokitansky believes that those not larger than a pigeon's-egg may have originated from the parovarium, while the larger must be referred to some other source. Dr. Farre, however, would not thus restrict them on account of their size, and remarks that "a considerable amount of fluid is sometimes collected in the canals of the parovarium; and this is probably the origin of the larger accumulations to which the term dropsy of the broad ligament has been applied."[2]

2. The form of serous cyst of the broad ligament to which attention is here particularly directed, I shall term the large serous cyst of the broad ligament. It has scarcely been rec-

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[1] Dictionnaire en trente volumes.

[2] *Op. cit.*, p. 597.

ognized at all except by ovariotomists in this country and in England, Dr. Frederick Bird and Mr. Cæsar Hawkins having recognized it previously to 1850, and Dr. Charles Clay at a still earlier date. It is of comparatively slow development, occurs most usually in young women, and frequently contains thirty to even forty pounds of fluid. Its wall is very thin, bluish, transparent, but slightly vascular, and lined by a cylinder epithelium. It contains a bluish-tinged serous fluid, clear and transparent as spring-water, and possessing high refractive properties, as manifested by its magnifying any small object seen through it, if lying at the bottom of the vessel which has received it. It has a specific gravity of only 1004 to 1005, and contains albuminate of soda, but no free albumen.[1] If the cyst be evacuated by tapping or by accidental rupture, it very seldom refills. Dr. Charles Clay has had forty cases cured by a single tapping, and only six which filled again. I have myself known one to refill in but a single instance—a case of Dr. J. C. Nott, of New York, to be again referred to. In one of my own cases, the cyst partially refilled at first, and during a typhoid fever, but subsequently became quite small and flaccid, and now, at the end of four years, can with difficulty be found in the pelvis. T. S. Wells states that he has seen some of these cysts refill. Dr. Keith, of Edinburgh, had, up to November, 1869, removed one of these cysts, which had been tapped five years before.

This form of tumor of the broad ligament is not pediculated till its attains to a considerable size, and in a majority of cases it never becomes so.[2] I have seen one containing between thirty and forty pounds of fluid which had no pedicle; but dipped down into the pelvis behind the ramus of the pubes on the right side, carrying the posterior layer of the broad ligament with it. Prof. Spiegelberg, of Breslau, removed a cyst of this kind, rising directly from the posterior fold of the broad ligament. Its outer layer contained muscular fibres, and it was lined by cylinder epithelium.[3] It was, I think, a small serous cyst of the broad ligament, which Klob describes under the preceding head as follows. He saw it in Rokitansky's Institute. It occurred in a laboring-woman, twenty years of age; was as large as a goose's-egg, and rose from the portion of the right broad ligament extending from the Fallopian tube to the outer extremity of the ovary. This cyst had employed this portion of the peritoneal reflexion as its covering to such an extent that the abdominal terminations of the right tube lay upon the upper cyst-wall; and its fimbriated extremity was coiled around the external periphery, and also somewhat downward. The lower periphery had likewise so nearly approached the ovary that on first sight it seemed as if the cyst were developed from the outer extremity of the ovary itself. The parovarium of this side was situated upon the anterior cyst-wall, between it and the peritonæum; and its tubes were stretched and somewhat crowded from each other.[1]

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[1] In a single instance examined by a friend, a mere trace was thought to be present.

[2] Dr. Kimball, of Lowell, Mass., has removed four of these cysts, only one of them having a pedicle.

[3] Schmidt's "Jahrbuch," 1871, No. 2, p. 176.

The thinness of the wall of the areolar cyst of the broad ligament accounts for the very distinct fluctuation it presents. It may continue a long time without much derangement of the general health, and is very seldom fatal.—(T. S. Lee, p. 121.)

Another kind of cyst is found in the broad ligament in the form of very small, densely-filled vescicles with delicate walls, frequently occurring in great numbers, especially in the vicinity of the tubes. I merely allude to them, they being of no practical importance.

Origin of the Large Serous Cyst.—Boinet speaks of cysts of the broad ligament arising—

1. From the areolar tissue of the broad ligaments.
2. From the parovarium.
3. From the vessels of the pampiniform plexus.

Deriving the first-mentioned class from the parovarium as above explained, I should refer the large serous cyst to the loose areolar tissue between the two folds of the broad ligament (p. 18). The closure of one or more areolæ in this tissue, and the subsequent accumulation of their serous contents, may constitute the commencement of the areolar cyst.

T. S. Wells, however, regards the large serous cyst of the broad ligament as not being developed from the areolar tissue, but thinks it is an ovisac which did not burst—received by the fimbriated extremity of the Fallopian tubes, and retained there to undergo development into the future cyst, the rest of the ovary remaining healthy. But cysts with similar contents are formed in the subperitoneal connective tissue both in front of the peritonæum—i. e., between it and the abdominal muscles—and behind it.[1]

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[1] Klob, vol. i., p. 389.

It may be added that tumors of the broad ligament are sometimes developed from the non-striated muscular fibres between its layers. Such an instance is reported in Schmidt's "Jahrbuch" for 1871.[2] It was "a large firm swelling covered by the peritonæum, having no connection with either uterus or ovaries, but proceeding from the smooth muscular fibres of the broad ligament of the right side."

II. **Hydrosalpinx**—(Hydrops Tubæ — Dropsy of Fallopian Tube—Hygroma of Fallopian Tubes—Hooper).—All pathological anatomists admit that an accumulation of fluid, to the amount of six to eight ounces, may occur in the Fallopian tube, thus producing a cyst as large as an orange; and that this constitutes an ordinary dropsy of this passage. Not very rarely, also, both tubes are thus affected at the same time. But whether such cysts ever attain to the size of the adult head, or larger, so as to be mistaken by the ovariotomist for a large ovarian cyst, is still, by some, considered doubtful.

Cases have been indeed reported, well calculated to dispel such doubts. Bonnet mentions a case in which one of the tubes contained thirteen pounds of fluid;[3] and in a case reported by De Haen there were thirty-two pounds in the tube, and the latter itself weighed seven pounds.[4] Cases have been reported of one hundred and thirty and even one hundred and fifty pounds of fluid.[5] The latter is usually clear, and nearly colorless, and contains but little albumen. Sometimes, however, it contains, as proof of preëxisting inflammation, flocculi of fibrine, or is thickened and altered by admixture with mucus, purulent matter, and blood. The last may impart to it the same coffee-ground appearance as it does in ovarian cysts.[1]

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[1] T. S. Lee, pp. 123, 124.

[2] No. 3, p. 288.

[3] "Sepulchretum Anatomicum," lib. iii., sect. 21, obs. 39.

[4] "Rat. Med.," lib. iii., p. 29.

[5] Several cases and preparations in the London Museum are referred to by T. S. Lee, pp. 237, 238.

Since the abdominal extremity of the Fallopian tube is the most distensible, the principal enlargement in the common cases occurs there, while the remainder of the tube presents a flexuous distention, somewhat resembling a portion of the small intestine (Fig. 29). But while the fimbriated extremity of the tube is closed, the uterine may or may not be so, as shown by Dr. Hooper, the fluid being too viscid to flow through so fine a passage. The cyst while still small almost always lies behind the uterus, but rises above it, and in front of it, as it enlarges, like an ovarian cyst.

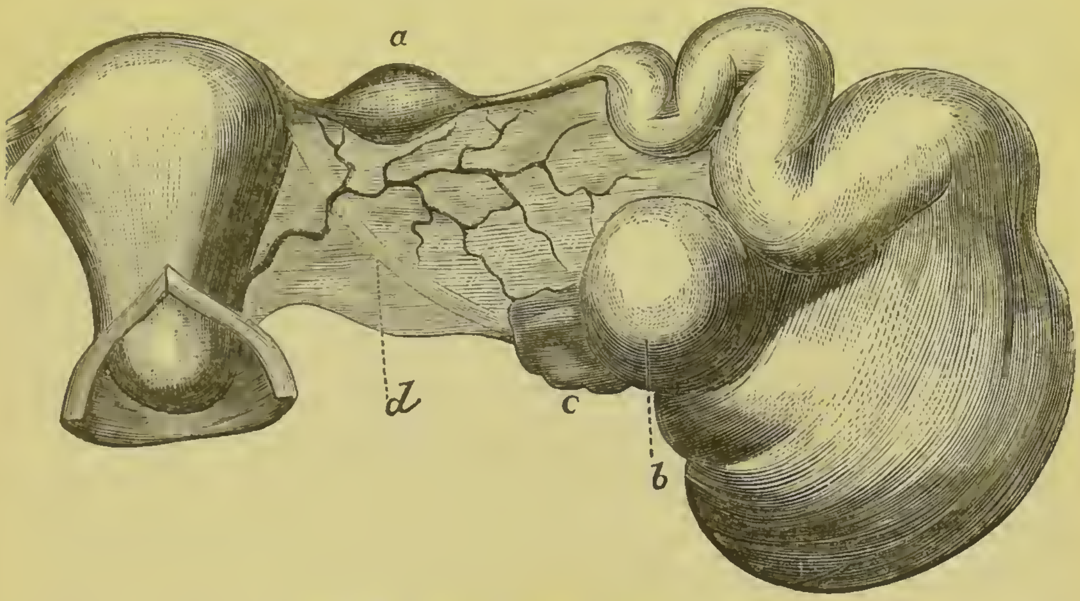

FIG. 29.—HYDROSALPINX.—TUBAL DROPSY.

a, Separate collection of fluid near uterus; *b*, Separate collection at fimbriated extremity of oviduct; *c*, Ovary; *d*, Ovarian ligament in the broad ligament of the uterus.—(Boivin and Dugès.)

I have already spoken of cases in which an ovarian cyst communicates directly with the Fallopian tube, and discharges its contents from time to time through that passage. Boinet (p. 106) is inclined to the opinion that this is also the fact in all cases of discharge of the fluid of an asserted tubal dropsy; and that the fluid had not accumulated in the tube at all. He also, in explanation of the reported large collections of fluid in a Fallopian tube, maintains that, after all, the collection is contained in an actual ovarian cyst, which had become detached when very small — perhaps as the original ovum—from the ovary; had entered the tube,[1] and subsequently been developed there. As the decision of this question possesses no particular interest, I omit M. Boinet's reasons for his opinion, as well as those of M. Bauchet, in favor of the other view of the subject (pp. 108–110), which I adopt. I have, however, not found the proof that a true dropsy of the Fallopian tube has discharged periodically through the uterus and vagina.

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[1] I. B. Brown, p. 27.

Dr. Farre doubts if the extreme cases I have quoted have been accurately observed; for, since the tube is ruptured by the distention of tubal pregnancy, during the first three or four months, he thinks it would not admit of the enormous enlargement noted in these cases. He believes that a "part of the fluid was contained in the ovary, for a concomitant enlargement of both tube and ovary is a very uncommon circumstance."

But De Haen definitely states that the tube was so hypertrophied and distended—containing thirty-two pounds—as to weigh *seven pounds.* Besides, this distention is a very gradual process; and no more remarkable than occurs in the ovary or the uterus in case of large cysts. The fact, also, that the ovary and the tube are seldom enlarged at the same time, is to be interpreted against Dr. Farre's view of the subject. In case of an ovarian tumor, therefore, the tube is easily found of normal appearance except as to its length, extending over the surface of the cyst, as before described (p. 36). If, therefore, we do not find the tube in the state just described in a supposed ovarian cyst, we must infer that it is not ovarian; while, if we trace the tube from the uterus into what appears to be an expansion of the former, and find no trace of the tube elsewhere, we are bound to admit that the case is a tubal cyst, without ovarian complication.

This question is anatomically decided by the following case:

A lady, forty-one years of age, consulted me in May, 1868, respecting a tumor supposed to be ovarian, with a view to its removal. It had already existed ten years, but had not essentially affected the general health till within the last twelve months. The tumor gave evident fluctuation over its upper portions, but seemed solid as felt *per vaginam.* The uterus was retroverted, and allowed the sound to pass two and three-quarter inches. Believing it to be a fibro-cystic tumor of the uterus, I advised delay till tapping should become necessary, after which the diagnosis could be more positively pronounced.

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[1] Boinet believes that these ova, non-fecundated, may be developed in the ovary, on its peritoneal surface, in the Fallopian tube, or anywhere in the abdominal cavity (p. 71).

In the following October she was tapped by her physician, and fifteen pounds of fluid removed. The tumor was decided by him to be undoubtedly an ovarian cyst, and a proper case for ovariotomy. She refilled rapidly, and was again tapped two months afterward (December, 1868). I saw her the second time in March, 1869. Still feeling doubtful as to the nature of the case, I decided to tap her myself before settling the question of ovariotomy, and removed eighteen pounds of an albuminous and slightly milky fluid. The whole tumor now disappeared from the touch, even the solid portion being no longer felt *per vaginam.* A sound was then passed into the uterus, and the organ lifted up so that it could be grasped through the thin abdominal walls; when the cyst was felt to be continuous with the uterus on the left side, though no distinct pedicle could be traced. As I still doubted if the tumor were ovarian, I decided to wait till the patient had rallied from the tapping, and then to make an explorative incision, and remove the tumor if found to be ovarian. She did well for three days, and then gradually failed for a week more, and died.

Nearly two quarts of fluid, mostly blood, were found in the sac, which had been tapped, which must have very slowly oozed from its internal surface, since the fluid obtained by the tapping was quite clear. The gradual failure of the patient's strength was seen to be due to the slow hæmorrhage. The tumor was found to be very adherent in the pelvis. The solid mass felt *per vaginam*, before the tapping, proved to be a cystoma of the right ovary, nearly as large as a fœtal head; and which had ascended beyond the reach of the finger after the pressure from above was removed by the tapping. The principal cyst, however, was on the left side, as had been previously ascertained, and was continuous with the muscular tissue of the uterus from its left horn. There was no pedicle; and not a trace of the left Fallopian tube or the left ovary could be made out. In fact, the cyst itself, which had contained eighteen pounds of fluid at the last tapping, was the hypertrophied and distended left Fallopian tube.

III. **Uterine Fibro-Cysts.**—Fibro-cystic tumors of the uterus were first distinctly recognized only very recently, and are quite rare. Only fourteen cases had been recorded in 1869, and two of these were detected after death by Kiwisch and Cruveilhier.[1] They may be either sub-peritoneal or interstitial. Their development may be rapid, but is usually slow in comparison with that of ovarian cysts. They very seldom occur before the age of thirty. Their name suggests a secondary cyst developed in a uterine fibroid. This is, however, not always the fact; since often no truly fibroid element is met with in the tumor, there being merely a cyst in continuity with the uterus, whose thick vascular wall is formed, like the latter, of non-striated muscular fibres and connective tissue.

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[1] Kœberlé, *Gazette Hebdomadaire*, No. 16, 1869.

Cruveilhier describes two distinct forms of uterine fibrocystoma:

1. In the first, we find irregular cysts without proper walls, produced by an œdematous infiltration of the original fibroma, the interlobular spaces slowly dilating and finally breaking down under the influence of the interstitial fluid. Thus irregular cavities are formed, more or less analogous to true cysts, but without distinct walls. The fluid contained in these cavities is serous, limpid, yellow, like the serosity of œdema, and sometimes hæmorrhagic.

2. Cysts with more or less regular cavities, and some with walls, are formed in the tissue of the fibrous growth, these cavities generally communicating by well-defined openings. The larger ones are spherical, while the smaller accessory ones are flattened, and form more or less irregular sinuses. The fluid contained in these cysts is limpid, yellow, fibrinous like lymph, and spontaneously coagulable. Cruveilhier thinks this form of fibro-cyst is produced by the progressive dilatation of lymphatic vessels; and states that they are always consecutive to some mechanical obstacles to the circulation of the lymph.

Klob merely quotes a single case from Kiwisch, and alludes to one described by Cruveilhier, after designating such instances as very rare, but extraordinary.[1]

That uterine fibro-cysts are far more rare in Europe than in this country, I have no doubt. Of T. S. Wells's first one hundred and thirty operations for tumors (one hundred and fifteen being ovariotomy), only two cases proved to be fibro-cystic tumors of the uterus.[2] He assures me that he meets with not more than one fibro-cyst for fifty ovarian cysts. Together with Dr. Keith's first one hundred operations of ovariotomy, only one case of uterine fibro-cyst occurred.[3] I have myself met with ten cases in the last two years, and have seen not less than fifty since my first operation of ovariotomy in 1850.[1] Dr. T. A. Emmet has met with nearly half as many fibro-cysts as ovarian cysts, and Dr. Charles Clay thinks he has met with nearly as large a proportion in five thousand cases diagnosticated. Of the nineteen operations for the removal of uterine fibro-cysts reported by Dr. C. C. Lee,[2] nine occurred in this country, eight in England, and two in France.

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[1] Klob, *op. cit.*, p. 182.

[2] "Diseases of the Ovaries," vol. i.

[3] *The Lancet* (London edition), August 20, 1870, p. 250.

These cysts, and especially the first variety, usually develop much more slowly than the two forms of cystoma ovarii, since during their first stage, as simple uterine fibroma, the growth, as of all solid tumors, is gradual. In many cases, however, this stage has remained entirely unrecognized, and this element of the differential diagnosis may therefore be wanting. On the other hand, the second variety sometimes grows quite as rapidly as either form of cystoma ovarii, and becomes as large as the latter ever do.

Their walls are usually darker (more livid) than those of ovarian cysts; and often very extended adhesions exist between them and the organs in contact, which resemble the chordæ tendineæ of the heart. Sometimes the adhesions take the form of broad, short, and thick muscular bands; though, usually, as before described, the fluid drawn by the first tapping is sometimes of a somewhat chocolate color, or of that of coffee-grounds, from the admixture of blood. It is, of course, the subperitoneal variety of uterine fibro-cyst which so nearly simulates the ovarian cyst, since the depth of the uterine cavity is usually not increased by it, as it is by the interstitial form.

Serous cysts of the mesentery are sometimes mistaken for ovarian tumors; and the same may be said of acephalocysts both of the mesentery and of the omentum majus. The latter are much more frequent than the former. A discharge of hydatids from the rectum sometimes decides the diagnosis. Cases of both kinds of cysts are given by Boinet.

The remaining conditions liable to be mistaken for ovarian cysts will be considered in connection with their differential diagnosis.

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[1] The nature of the cases having been verified in twenty-three instances by gastrotomy (three times by myself), by a *post-mortem* examination, or by an examination of the fluid of the cyst.

[2] *New York Medical Journal*, November, 1871, p. 478.

CHAPTER V.

THE DIAGNOSIS OF OVARIAN TUMORS.

Dr. Krassovsky remarks, in 1867, that "as yet we have no good description of the diagnosis of ovarian cysts,"[1] a statement admitting of no essential qualification at the present time. All surgeons are aware of the diagnostic difficulties presented by almost all the varieties of abdominal tumors. But they are greatest of all, and demand the most deliberate and patient investigation, in cases of the kind of tumors under consideration. It is, however, in these cases that a correct diagnosis is most of all important; since upon it may hang the performance or non-performance of the most formidable, and, in many instances, the most difficult and dangerous operation the surgeon ever attempts.

I now proceed to specify the signs of ovarian tumors, more particularly in the second and third stages of their development; since it is only after the middle of the second stage is completed that the operation for removal of the tumor is, with a very few possible exceptions, to be thought of.

The signs of ovarian tumors are **general** and **local**; and the latter are divided into the **rational** and the **physical.**

1. The *general signs* include the history of the case, the expression of countenance, the appearance of the neck and upper extremities, the degree of activity of the kidneys, and sympathetic affections of the mammæ.

2. The *rational local signs* are the symptoms detected by the patients as specified in a preceding section (pp. 90–93).

3. The *physical local signs* are those obtained by the various means of physical exploration hereafter to be mentioned.

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[1] *Edinburgh Medical Journal*, 1867, p. 540.

SECTION I.

THE GENERAL SIGNS OF OVARIAN TUMORS.

These signs, except those deducible from the history of the case, depend upon the general health and condition of the patient; they therefore become decided only in the third stage, and rarely in the last part of the second stage, of the disease.

1. **History of a Case of Ovarian Tumor.**—Supposing the case to be so far advanced (to the middle of the second stage or further) that the question of operative interference may arise, the following are usually the prominent facts in the history of the case:

Several months since (nine to eighteen months) the patient discovered a round tumor at the lower part of the abdomen, lying at one side of the median line. It was easily displaced, while she lay upon her back, toward the opposite side. It was not and has not been tender on pressure, and gave no trouble at all till it ascended above the umbilicus. Up to this time her health has been as usual. Now the navel is prominent as in pregnancy; and the tumor assumes a central position, and can no longer be displaced laterally. While extending upward, the abdominal veins become enlarged and apparently more numerous, and amenorrhœa, dyspnœa on slight exertions, and derangements of digestion supervene. The activity of the kidneys has been diminished since the tumor attained to the umbilicus; and in some cases the lower extremities have become œdematous.

The time elapsing after the patient detected the tumor until it came to the middle of the third stage (as high as the pregnant uterus at seven months) will be about a year for oligocysts, and less for polycysts, with, of course, very many exceptions. Time is, however, an important element in the diagnosis of ovarian tumors. If the case has already continued without tapping three years or more since the patient first detected the enlargement, something else than an ovarian tumor is to be suspected; though it may possibly prove to be one. The history is, however, to be regarded as among the less reliable elements of diagnosis of ovarian tumors.

2. **Expression of the Countenance.**—The modification of the features during, and very seldom before, the third stage is peculiar, but difficult to describe. Fig. 30 conveys an idea of it; and I. B. Brown gives the following description: "The face is elongated, thin, and rather shrivelled; anxiety and care are strongly depicted on the features; the angles of the nose and mouth are drawn downward; the lips thinned; the cheeks furrowed; the eyes are remarkably defined, the space between the eyelids and bony margin of the orbits being sunken and hollow; indeed, the whole areolar adipose tissue of the face is atrophied; the complexion is pale, but without that peculiar leaden aspect or sallow or parchment-like color seen in malignant disease" (p. 39). Mr. Wells terms the peculiar expression the "facies ovariana."

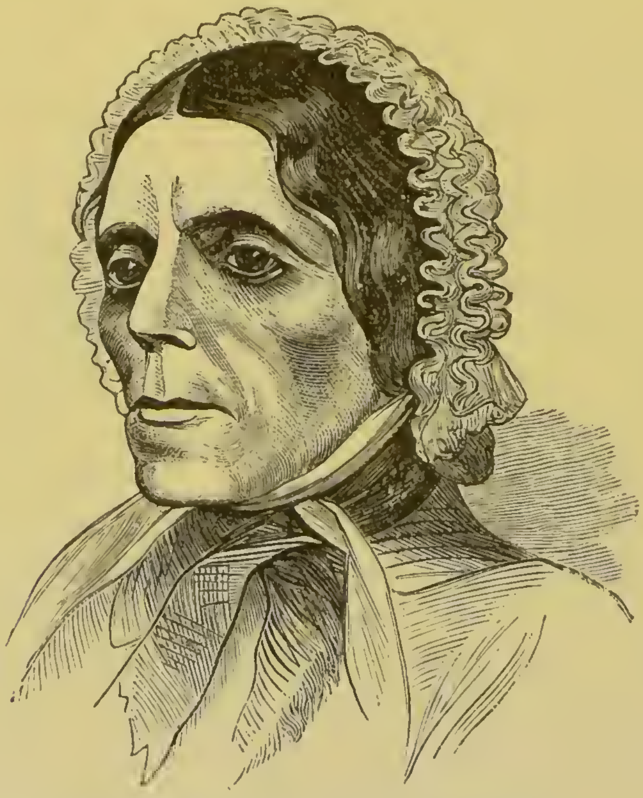

FIG. 30.—FACIES OVARIANA.—(After Wells.)

3. **Emaciation of the Neck and Shoulders** is also usually quite marked at the middle of the third stage, followed by that of the upper extremities.

4. **Œdema of Extremities.**—It is not till very late in the disease, in the fourth stage generally, that the lower extremities,

and perhaps also the abdominal walls, become œdematous. In case of oligocysts, however, this rarely occurs before other urgent symptoms demand surgical interference. If it has already occurred, the vital force is probably very much exhausted. In case of polycysts, however, and especially if adherent in the pelvis, œdema of the lower extremities is not so very uncommon. It is very common in cases of ascites complicated with ovarian tumor, and in such cases its significance is merged in that of the ascitic effusion (p. 97). In this connection it is regarded as merely the result of pressure of the tumor on the iliac veins, and not as a grave symptom, though it always suggests a very thorough investigation of the case before deciding upon any operative procedure.

Late in the disease the abdominal veins become enlarged and prominent (Fig. 31), though a supervening œdema may conceal this condition.

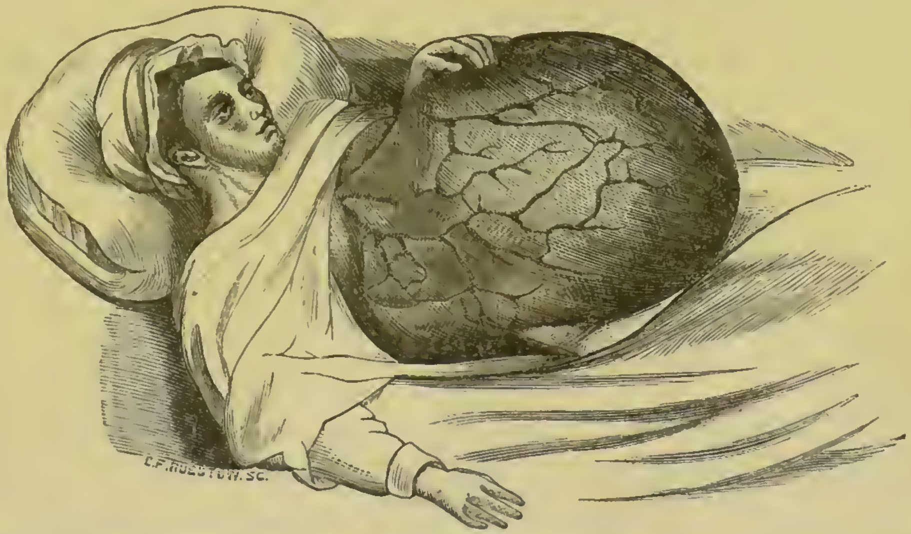

FIG. 31.—Large Ovarian Cyst, Fourth Stage; showing Enlarged Veins on Abdomen.

5. The **mammæ** may become **enlarged** and **painful** in the second and third stages, and even afford a milky secretion. The areola around the nipple may become dark, and morning-sickness may occur. But all these symptoms are rare.

6. A notable **diminution** of the **activity** of the **kidneys** almost invariably attends the whole of the third and fourth stages, and the last part of the second. Very rarely also, suppression of urine occurs from pressure of a solid tumor on the ureters, or from adhesions in the pelvis.

7. Lastly, the general nutrition fails, and great emaciation supervenes.

The preceding general signs, without any coexisting signs of cardiac or renal disease, afford a very strong presumption of the existence of an ovarian tumor; and their absence may be regarded as a certain evidence of the non-existence of such disease.

SECTION II.

LOCAL SIGNS OF OVARIAN TUMORS.

1. Referring to Section IV. (Chapter III.), for the **Rational Local Signs of Ovarian Tumors,** I proceed to speak here of the physical.

2. **Physical Local Signs of Ovarian Tumors.**—These signs are obtained by inspection, mensuration, palpation, percussion, auscultation, and change of patient's position; from the vaginal touch, the use of the uterine sound, the rectal touch, the exploring trocar; from chemical and microscopical examination of the fluids obtained; and from exploratory incisions.

It is to be understood that, as preparatory to these examinations, the patient is placed upon the back, with the thighs somewhat flexed on the abdomen, the bladder having been previously evacuated.[1] She must also be instructed *not* to hold her breath.

1. By *inspection* of the abdomen (and mensuration, if required), the enlargement is detected in the second stage, at first on one side, and gradually extending across and upward. The outlines and size of the tumor are also perceived in a general way. In the third stage the abdomen appears symmetrical; perhaps, in case of a very large tumor, the umbilicus is prominent, and mensuration may be resorted to for the girth and other dimensions of the abdomen. The particular dimensions to be taken will be specified in Chapter VIII., Section II.

2. By *palpation*, the tumor is felt, in the beginning of the second stage, in the iliac region, and found to be quite movable,

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[1] Fehr remarks that the diagnosis of all pelvic tumors commences by using the catheter. P. 51.

unless already adherent, or having a short pedicle. Its outline and size are now accurately made out; as also the character of its surface, whether smooth or lobulated, firm or elastic. In the third stage, however, in case of a monocyst, the outline is made out with great difficulty. A fibroma of the ovary (p. 26) seldom advances beyond the second stage in size, is perfectly resistant to pressure, and has a spheroidal and smooth surface. A small tumor of any kind with a large ascitic effusion, of course, cannot be felt at all. The lobulated anterior surface of a polycyst, if consisting of small cysts, is easily distinguished at any stage.

3. But *percussion* must mainly decide the question between a solid tumor and a cyst, since it detects fluctuation in the latter. It also distinguishes tympanites from both. Of no avail in the first stage, unless associated with the vaginal touch, it is therefore of the greatest value in the second and third stages. But, though an evident fluctuation proves the existence of a cyst, or of ascites, its absence does not demonstrate that there is no fluid in the tumor, as will be explained (p. 126). Besides, an apparent fluctuation may deceive, as may also the impulse given by a semi-solid or a solid tumor. But the latter is communicated instantly from one hand to the other, while fluctuation gives a perceptible interval of time. Nor can percussion make us entirely certain that any ovarian tumor is a monocyst. The most it can do in any case is, to enable us to decide very positively whether all the portions of a fluctuating tumor, which are accessible by palpation, are parts of one and the same cyst; for small cysts may be attached to the larger one, at a point impossible to detect.

4. *Auscultation* may also be applied, in case of a supposed ovarian tumor, with advantage, since it decides positively, if such tumor exist, against the existence of pregnancy. It, however, sometimes discovers a sound, it is said, in a large ovarian cyst, which very much resembles the placental murmur. Churchill and Scanzoni think they have heard it. Kiwisch carefully auscultated thirty large ovarian tumors, but could not detect any sound of the circulation.[1] Simpson asserts that it may be heard in a uterine fibroid, but never in an ovarian cyst.[2] Ki-

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[1] *Op. cit.*, page 37.

[2] Quoted by Fehr, p. 48.

wisch considers these two facts as not altogether unimportant in the diagnosis.

5. By *changing the patient's position*, the tumor, during the second stage, changes its relation to the contiguous parts, though in the third this may not be the fact. But the line of dulness, and the extent of the fluctuation, may be thus changed until the third stage is reached; and this is very important in the differential diagnosis of ascites and a large ovarian cyst (p. 131), since the latter is thus changed, but in a different way.

6. By the *vaginal touch*, the first stage of an ovarian tumor is the most positively ascertained, and, combined with percussion, it may decide as to its solid or cystic character. The tumor is felt behind the uterus and on one side of the pelvis; is not tender, as is a merely displaced ovary; is movable, and, if a polycyst, is lobulated. If, however, the component cysts of the latter are very small, no fluctuation may yet be detected in them. But a solid tumor resists pressure, and has a smooth surface.

Sometimes, in the second and third stages, an ovarian cyst cannot be reached at all *per vaginam*, and other signs must therefore decide as to its real character. Such a tumor may be supposed to have a long pedicle. *Per contra*, if the tumor is, in these stages, found still to fill much or most of the pelvic cavity, it probably has a short pedicle, and, if a polycyst, probably has pelvic adhesions. In the last case, the uterus may still be found in front of the tumor; in other circumstances, it is, in the third stage, behind it. The uterus often lies higher than its normal position, in cases of oligocysts with a long pedicle.

It is the rule that the lowest portion of all forms of ovarian tumor can be reached *per vaginam* during all the stages of its development.

7. By the use of *the uterine sound*, the relations of the tumor to the uterus, the mobility of both, and the depth of the uterine cavity, are ascertained. Of course, the last should not be notably increased by an ovarian tumor; while it is very generally so by an interstitial uterine fibroma or fibrocyst.

In the first stage the relation and position of the uterus are found as stated under the preceding head. It is also perfectly movable, independently of the tumor. It acquires some lateral deviation during the second stage, and gets behind the tumor in the third. It is then fixed by the pressure of the tumor, even if the latter is not adherent in the pelvis; and may be placed centrally, or more or less inclined to one side.

Dr. Simpson's remark, that, "if the sound show a tumor in front of the uterus, the disease is certainly not ovarian,"[1] is incorrect. The uterus is in front of an ovarian tumor only in exceptional cases (p. 69); but is often so in cases of uterine fibroma and fibrocyst.

8. By the *rectal touch*, the tumor may be felt during the first stage; and higher on its posterior surface than *per vaginam*. Fluctuation or a lobular surface may also be recognized in some instances only by this method of exploration.

9. By the use of *the exploratory trocar*, a specimen of the fluid, if a cyst, may be obtained, for chemical and microscopical examination. There is, however, considerable risk, and often no very satisfactory result, in all the methods resorted to, until recently. Prof. Spiegelberg, of Breslau, has seen two cases, and Hegar, of Freiburg, a single one, terminate fatally after the use of the exploring trocar.[2] Dr. H. F. Walker, of New York, recently proposed the use of the common hypodermic syringe for this purpose;[3] and which, I think, has proved to be entirely safe. It, however, obtains a sufficient quantity of fluid, only by several times detaching the syringe from the tube, or by several introductions of the latter.

I have, therefore, recently devised a modification of Dieulafoy's apparatus, "pour aspiration pneumatique soucutanée," which answers every possible requirement. By it any amount of the fluid for examination may by a single puncture be pumped out of the cyst, and with perfect safety, so far as I have used it.[4] (Fig. 32.)

If, however, no fluid at all is obtained from a supposed cyst by the use of this instrument, the tumor is not thus proved to be a solid one ; since the fluid of a cyst is not seldom too viscid to flow through so fine a tube. But, if a free lateral motion can be imparted to the extremity of the tube, the tumor cannot be a solid one. On the other hand, the fluid obtained from a supposed cyst may, in fact, have been drawn from the peritoneal cavity, ascites having existed either alone or as a complication with ovarian tumor. I have myself once committed this oversight, in the last-mentioned circumstances. I have therefore added to the apparatus a second tube, four and three-fourths inches in length, in order to be able to penetrate the cyst through the ascitic accumulation.

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[1] *Edinburgh Monthly Journal*, 1843, p. 701. Mr. I. B. Brown adopts Dr. Simpson's idea.

[2] *American Journal of Obstetrics*, May, 1870, pp. 170, 171.

[3] Ibid , p. 120.

[4] The fluid may, however, subsequently escape into the peritoneal cavity, if very limpid, if the finest trocar be used; but, the more limpid, the less irritating to the peritonæum.

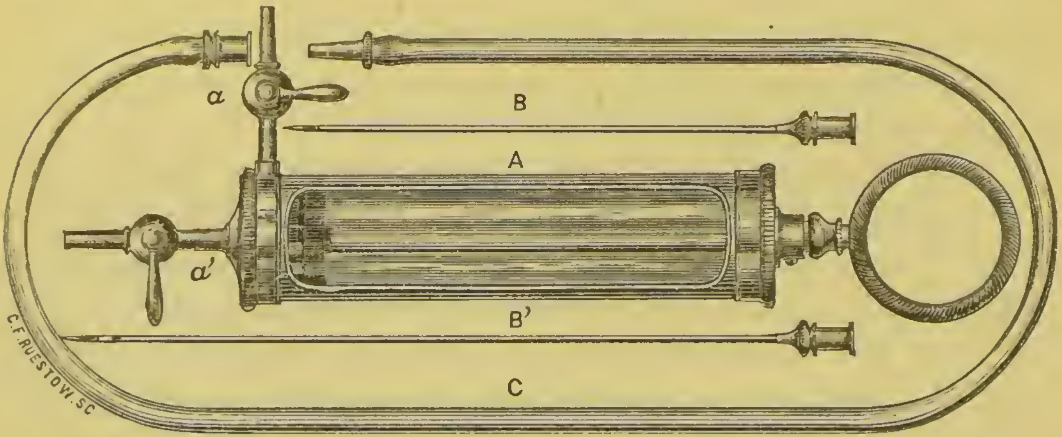

FIG. 32.—SYRINGE FOR EXPLORATION OF OVARIAN CYSTS.

A, instrument, 5¾ inches long; *B*, gilded tube, 3 inches long, and $\frac{1}{20}$ to $\frac{1}{18}$ inch in diameter, with bevelled point; *B'*, similar tube, 4¾ inches long; *C*, rubber tube, to be attached to arm *a*, by which the fluid, drawn from the cyst through *a'*, is forced out. The stop-cocks at *a* and *a'* are both shown as closed.

10. On *chemical examination*, the fluid of an ovarian cystoma will probably always be found to contain albumen, if it be limpid enough to flow through the fine tube of the exploring trocar, and will have a specific gravity of not less than 1,010. The small cysts of a polycystic cystoma do not, however, generally contain albumen, but only the mucous peptone (colloid substance) described by Eichwald (p. 31). Ascitic fluid also contains albumen ; and this undergoes a kind of coagulation, if the fluid is left at rest for ten or twelve hours, as the fluid of an ovarian cyst never does. The latter, however, may cease to give any evidences of the presence of albumen after six or eight days, though it still presents no signs of decomposition, as I have found in two instances.

The presence of albumen therefore in a fluid, supposed to come from an ovarian cyst, only excludes a cyst of the broad ligament, and the dermoid cyst. There may be an ovarian cystoma, or ascites, or a uterine fibrocyst. The color of the fluid is, however, almost characteristic of ascites—a light straw-color; it is a little darker usually in an oligocyst which has not been tapped; and darker still, or more decidedly colloid, in a polycyst. In the uterine fibrocyst, it is at the first tapping light colored, but more opaque than the ascitic or the oligocystic fluid.

Fatty contents, soluble in ether, show the cyst to be of the dermoid variety.

11. The *microscope* detects moving amœboid corpuscles in ascitic fluid, but not in either of the other three fluids mentioned in the preceding paragraph. Since Von Recklinghausen has shown that the peritoneal cavity is partly a lymph-sac in reptiles and still lower animals (p. 13), and almost exclusively so in the highest, the peritoneal epithelium becomes an endothelium; i. e., is analogous to that of the blood-vessels, and especially of the lymphatic vessels and sacs. The colorless corpuscles accordingly from both sources manifest amœboid movements. The amœboid corpuscle might therefore mislead only in case there was ovarian cystoma with ascites, and where, from rupture of the former, its fluid had become mixed with that before in the peritoneal cavity. Here, however, the epithelium-cells of the cyst would be mixed in great numbers with the endothelial cells of the peritonæum, and easily distinguished. For these pavement-cells (p. 35) are as distinctive of the cyst as the other form is of the peritonæum. If plates of cholesterine are also seen, the proof of ovarian cyst amounts well-nigh to a demonstration.

But a still more striking characteristic when met with, of the fluid of ovarian cystomata, is the ovarian glomerulus, or "gorged granule" spoken of by Mr. Nunn, though he does not attach much diagnostic importance to it,[1] and which is recognized by Kœberlé and Dr. W. L. Atlee, and described as found in some of the ovarian cysts recently removed by the latter.[2]

These glomeruli are of a brownish-yellow color, composed of granules, and are $\frac{1}{8000}$ to $\frac{1}{700}$ of an inch in diameter. They are represented by Fig. 33. I have not been able to detect them in the fluid of all cysts known to be ovarian; and further observation is necessary in order to determine their precise diagnostic value. Kœberlé figured them in his monograph, in 1865.[1] Spiegelberg and Waldeyer make no mention of them. Prof. Vallette, of Lyons, terms them *corpuscules inflammatoires*.

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[1] Brown on Ovarian Dropsy, p. 47.

[2] Case 204, *American Journal of Medical Sciences*, January, 1870, p. 104; cases 210 and 211, ibid., October, 1870, p. 430. They are here called granular corpuscles.

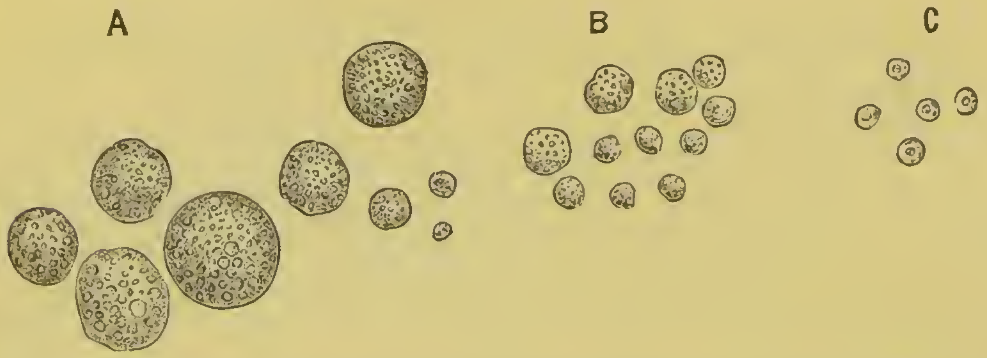

FIG. 33.—SHOWING THE "OVARIAN CORPUSCLES" *A*, and their size as compared with pus-cells *B*, and blood-corpuscles *C*.—(Kœberlé.)

12. But the *spectroscope* promises to aid us in the precise diagnosis of ovarian cystomata even more than the microscope.[2] Dr. Thudicum has shown that luteine, the yellow coloring-matter of the corpus luteum, exists also in the egg, in butter, in blood, in the yellow evacuations of nursing infants, and in the fluid contents of ovarian cysts (of the cow). In all these substances, luteine has a spectrum distinguishing it from all other coloring-matters; and in each it also has slight modifications distinguishing each from all the rest. The spectroscope may, therefore, be expected to distinguish the ovarian cystoma from all other cysts; or may perhaps distinguish between oligocysts on the one hand, as originating from the ovisacs, and polycysts which are developed in the ovarian stroma.

Fig. 34 represents the spectrum of luteine from an ovarian cyst of a cow; and Fig. 35, the same from a corpus luteum.

The three short absorption-bands actually extend across the spectrum like the rest. They are here drawn thus, to represent their relative intensity of darkness. All the absorption-bands of luteine are to the right of the line E of the solar spectrum, extending from the blue to the violet: from 92 to 163 of the scale for the luteine of the ovarian cyst, and from 106 to 179 for that of the corpus luteum.[1]

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[1] "Opérations d'Ovariotomie," Pl. vi., Fig. 8.

[2] Dr. S. Waterman, of New York, who is successfully pursuing the medical applications of the spectroscope, has kindly undertaken a series of investigations on this subject; but does not consider them sufficiently numerous, up to the time these sheets go to press, to justify the publication of his results.

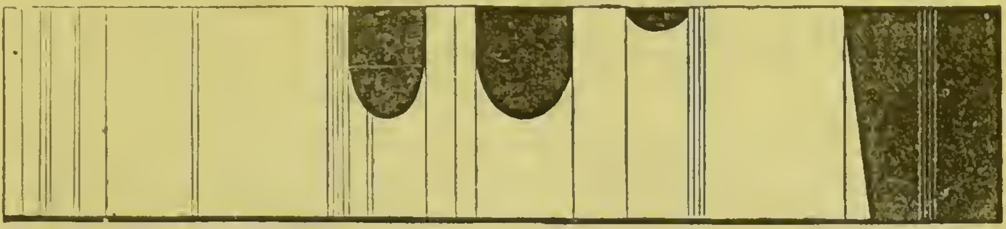

FIG. 34.—SPECTRUM OF LUTEINE FROM AN OVARIAN CYST OF A COW.—(Thudicum.)

13. *Exploratory incisions*, for the purpose of completing the diagnosis, will be considered in Section IV., Chapter VII.

If *all* the signs of ovarian tumor derived from the preceding sources point affirmatively, the existence of such tumor may be regarded as demonstrated. I. B. Brown gives a *résumé* of his ideas on this subject in the following words: "When, with a slowly-increasing abdominal tumor, there are such general signs as emaciation, sunken or contracted features, the absence of marked œdema of the legs, of the special symptoms of ascites, or of those organic lesions productive of it, of any notable impairment of the patient's activity, of any great deterioration of the functions of life, and of the characteristic signs of pregnancy, we may suspect ovarian dropsy to exist. When percussion reveals fluctuation, and in every change of posture the fluid is detected at the most prominent part of the tumor, while the intestinal sound is present only on the sides, and the dull sound extends into the pelvis, ovarian dropsy may be more than suspected—it may be presumed to exist.

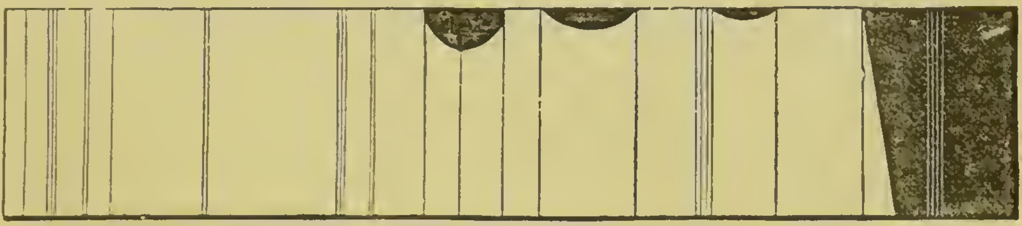

FIG. 35.—SPECTRUM OF LUTEINE FROM CORPUS LUTEUM OF A COW.—(Thudicum.)

"When, in an earlier stage, an examination *per vaginam et rectum* discovers an elastic tumor in the recto-vaginal pouch, loose in position, and probably distinctly fluctuating, without the presence of the symptoms of hernia, or of the pain of a prolapsed ovary, then we may be almost certain that it is a dropsical ovarian cyst, and, by watching, the progressive increase of the tumor strengthens the conviction" (p. 45).

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[1] Report of the Medical Council, London, 1869, pp. 186, 194.

The following recapitulation of the two preceding sections is more full, and distinguishes the three stages of the ovarian disease. The fourth stage needs no separate notice here, as it differs from the third mainly in a mere exaggeration of all its signs:

First Stage.

GENERAL SIGNS.—None.

LOCAL SIGNS.

Rational Signs.—No pain usually; irritation of bladder, and dysmenorrhœa not uncommon; constipation; hæmorrhoids; weight in pelvis; sometimes all the signs of early pregnancy; and a coexisting amenorrhœa.

Physical Signs.—Tumor is behind and to one side of uterus; movable; not tender; kind of tumor determined by the form, density, etc.

Sound separates tumor from uterus, and moves latter independently of former; uterine cavity normal in length; tumor sometimes adherent in this stage; rectal examination confirms the vaginal, and gives further facts as to form of surface, size, and density.

Fluid obtained by exploring instrument characteristic.

Second Stage.

GENERAL SIGNS.—Not marked in most cases. In some, the neck and shoulders become thin; and the peculiar expression (p. 110) is seen in this stage.

LOCAL SIGNS.

Rational Signs.—Tumor now detected by patient; frequent micturition; diminished urinary secretion; pain in iliac region or back; dragging in the latter; menstruation irregular and scanty toward end of this stage.

Physical Signs.—Tumor rising from symphysis pubis to umbilicus; on one side at first, and movable toward the other; feels firm if solid; elastic, or fluctuating, if cystic; outlines of tumor well defined by percussion; it falls to lower side of abdomen on placing patient on the side. *Per vaginam*, fluctuation distinct, if an oligocyst. Relation of uterus at first as in first stage; next it inclines laterally, and then gets behind the tumor; stays in front if there be adhesions in the pelvis.

Rectal examination confirms the vaginal; or, perhaps, reaches the tumor when the vaginal does not. Fluid, examined chemically and microscopically, contains albumen, and the epithelial cells and glomeruli.

Third Stage.

General Signs.—Well marked. Peculiar expression of face, and thinness of neck and upper extremities. Rarely, œdema of lower extremities, unless in case of polycyst, or together with ascites. Abdominal veins enlarged and prominent. General emaciation. Amenorrhœa. Increased inactivity of the kidneys.

Local Signs.

Rational Signs.—Dyspnœa on slight efforts; appetite diminished; digestion failing; irritability of stomach and bowels; great emaciation; vomiting and diarrhœa; irregular, then weak and rapid action of heart; hectic fever, and the aphthous tongue.

Physical Signs.—Great enlargement of abdomen—circumference thirty to fifty inches or more; umbilicus protruding; outline of tumor lost, if a monocyst, and fluctuation general; slight change from changing patient's position, unless ascites coexists.

Per vaginam, as in second stage; uterus usually behind tumor; often too low, if a polycyst, seldom so if a monocyst; is not movable; rarely, in front of tumor.

Per rectum may, in case of polycyst, reach additional small cysts, or a solid portion.

Chemical and microscopical character of fluid as in second stage.

Exception.—If the cyst communicates with intestine, percussion will give a tympanitic instead of a dull sound.

Dr. W. L. Atlee regards pulsation of the abdominal aorta, felt through the mass, as pathognomonic of ovarian tumor.[1]

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[1] *American Journal of Medical Sciences*, July, 1844, p. 64.

LEEDS SCHOOL OF MEDICINE

CHAPTER VI.

DIFFERENTIAL DIAGNOSIS OF OVARIAN TUMORS.

The preceding views of the diagnosis of ovarian tumors may suffice for all practical purposes, during the first and perhaps all of the second stage. But when we come, in the third stage, to the question of surgical interference, and perhaps of extirpation of the tumor, a more searching investigation must be made.

All of the following pathological conditions have been mistaken for an ovarian tumor, and many of them very often. Perhaps even this list might be increased:

- Ascites.
- Pregnancy,
  - Normal.
  - Extra-Uterine.
  - Molar and Hydatidiform.
  - Spurious.
  - With Ovarian Cyst.
- Encysted Dropsy of Peritonæum.
- Tumor of Broad Ligament.
- Tumor of Mesentery.
- Uterine Fibroid, and Fibrocyst.
- Distended Bladder.
- Retained Menses.
- Excessive Obesity.
- Physometra.
- Hæmatometra.
- Hæmatocele.
- Tympanites.
- Renal Tumor.
- Floating Kidney.
- Splenic Cyst.
- Hepatic Cyst.
- Fecal Tumor.
- Pelvic Abscess.
- Retroflexion.

Before laying open the abdominal cavity, we should not only be assured, if possible, that we have an ovarian tumor to deal with, but, in view of the many mistakes that have been made, we should also be positive that it cannot be any thing else. To do this, we must pass in review all the other conditions which may be mistaken for ovarian tumors, and show, as far as possible, how to distinguish the latter from the former. Dr. John

Clay, in his statistical tables, mentions no less than twenty-one mistakes of this kind; and most fortunate as well as discriminating is the ovariotomist who can say with Dr. Keith, of Edinburgh, after he has performed one hundred and thirty-six ovariotomies,[1] that he has not committed an error in diagnosis.

Entering next upon the differential diagnosis of ovarian tumors, it will be understood that the latter are regarded as in the third stage or the last part of the second, unless otherwise described in any particular instance.

Supposing, then, the case to be before us for examination, I propose the following method of investigation as being the most logical I have adopted in practice, and the most discriminating also, since it proposes definite questions in a certain order, and of which some are, otherwise, liable to be overlooked.

And the first inquiry, in a case of supposed ovarian tumor, is whether there is actually any enlargement within the abdominal cavity.

QUESTION I.—*Is there actually any enlargement within the abdominal cavity?*

In several instances the abdomen has been laid open for the removal of an ovarian tumor, when no tumor of any kind existed; and still less seldom a patient has been tapped for ascites or ovarian dropsy, when there was no fluid to be removed. The above question is, therefore, by no means an idle one.

The conditions which have led to the idea of enlargement within the abdominal cavity, when there actually was none, are great obesity of the abdominal walls; the phantom-tumor; and what is called false or spurious pregnancy; great œdema of the subcutaneous tissue of the abdomen; and tympanites:

1. The first operation attempted in Great Britain, for the removal of an ovarian tumor, was performed by Mr. Lizars, of Edinburgh, in October, 1823, on a patient who was found, after laying open the abdomen from the symphysis pubis to the ensiform cartilage, to have no tumor at all, but merely an accumulation of fat under the skin of the abdomen.[2] It should be

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[1] Correspondence, January 22, 1872.

[2] *Edinburgh Medical and Surgical Journal*, vol. xxii., p. 252, 1824.

added that "all the other eminent surgeons who had seen the case (Mr. Lizars's), supposed it to be an ovarian tumor." A similar mistake was also made in Berlin, where gastrotomy was performed upon a patient by Prof. Dieffenbach, in August, 1828, at the request of Dr. Ernest Ludwig Heim, "who, with many other physicians, had diagnosed the existence of extra-uterine gestation. . . . To the amazement of all present, not only was no child found, but not even a tumor of any kind."[1]

It should be remembered that an accumulation of adipose tissue beneath the skin of the abdomen, especially below the umbilicus, is not a very uncommon occurrence in women at the age of thirty-three to thirty-eight years; and that it is far more common in those who have not borne children. Increasing rapidly, it has been often mistaken for pregnancy, as well as for ovarian tumor: and the deception is increased by the semi-lobular form of the mass.

As all the signs of ovarian tumor are, however, wanting in such cases, and the mass of fat can be lifted up from the abdominal muscles, such a blunder at the present day is scarcely excusable. Dr. G. Pepper has reported three such cases of obesity.[2] Accumulations of fat in the omentum are more rare, and more difficult to detect; but these also want the history and the signs of ovarian disease.

2. Of the phantom-tumor, I need only say that in very nervous, and especially hysterical women, a peculiar contraction of the recti muscles sometimes occurs, which simulates an abdominal tumor. This action may be either voluntary or involuntary; but if the patient become engaged in conversation on some subject of interest to her, the contraction ceases. If, however, doubt remain whether an enlargement exist within the abdominal cavity, the method of Roederer may be resorted to; i. e., press the hand deeply upon the abdomen, and to all parts of it in succession, while the patient is making a deep and prolonged expiration. A tumor so small as to be overlooked by all other methods may often be thus detected. Finally, the administration of an anæsthetic may settle all possible doubt.

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[1] Tanner, "On the Signs and Diseases of Pregnancy." Philadelphia, 1868, pp. 150 and 304.

[2] *American Journal of Obstetrics*, February, 1870, p. 679.

3. In cases of spurious pregnancy so called, there is no actual enlargement within the abdominal cavity, except so far as it may be due to tympanites. Such cases have been mistaken for both pregnancy and ovarian tumor. But the history of ovarian disease is entirely wanting, as are also all the more distinctive signs of pregnancy.

In actual pregnancy the intestines sometimes rise higher than usual, during the first two or three months, constituting an apparent enlargement within the abdomen.

4. Great œdema of the abdomen has been mistaken for internal enlargements; but the pitting on pressure should detect its real nature at once.

5. But, most incredible of all, even tympanites has been mistaken for an ovarian tumor, and the abdominal cavity opened for its removal. Boinet relates such a case (pp. 200, 201), and Dr. Simpson quotes six cases in which, on opening the abdominal cavity, only tympanites was found.[1] This is a blunder which, as Fehr remarks, should never be made. The clearness on percussion of every part of the abdomen, the tenseness and equable distention of its walls, the absence of fluctuation, and the absence of any evidence of tumor obtained by palpation, should at once distinguish this condition from ovarian tumor. Besides, tympanites is usually accompanied, if chronic, by great derangements of digestion; especially by gaseous eructations, vomiting, and obstinate constipation. If it be suddenly induced, as in some hysterical women, this fact is only the more inconsistent with the idea of ovarian tumor.

The opposite mistake to the preceding—deciding that there is no internal enlargement when it really exists—is less hazardous to the patient, inasmuch as no practical action is based upon the decision.

If our examination thus far leaves no doubt that there is an enlargement within the abdominal cavity, the next inquiry is:

QUESTION II.—*Is there fluctuation, indicating an accumulation of fluid within the abdomen; or a solid tumor?*

1. If there be fluctuation, there is fluid either in the peritoneal cavity, or in the gravid uterus, a cyst or an abscess.

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[1] Fehr, p. 51.

2. If there be no apparent fluctuation, although there is an enlargement within the abdominal cavity, a solid tumor of some kind may be supposed to be the cause.

Still, the mere non-detection of fluctuation by percussion is not to be accepted as proof of the non-existence of fluid, without further investigation. For fluctuation may be rendered very indistinct, or may be entirely prevented, though a fluid be present, by the following causes:

1. Great thickness of the abdominal walls, from fat or œdema, whether the fluid be in the peritoneal cavity or in a cyst.
2. Great thickness of the walls of a cyst, they being, in dermoid tumors and polycysts, sometimes one inch to one and a half inch thick.
3. Great tenseness of the cyst, even though it be a large one.
4. Great density of the fluid, as in colloid cysts.
5. Small amount of fluid in each cyst, as in many polycysts.

If, however, none of these causes of non-fluctuation be believed to exist, and the tumor apparently rises from the pelvis, it may still be regarded as a solid one; and is probably an ovarian fibroma, or some one of the following:

Uterine Fibroma.
Mesenteric Fibroma.
Hæmatocele.
Fecal Tumor.
Retroflexion of the Uterus.
Hypertrophy of the Uterus.
Carcinoma of Body of Uterus.
Floating Kidney.

1. Inasmuch as the **uterine fibroid** is mistaken for an ovarian cyst even more frequently than it is for an ovarian fibroma, it will be specially considered under question sixth.

The only points I need mention here are, that the uterine fibroid is vastly more common than the ovarian; is tender under pressure, and, except when sub-peritoneal and pediculated, is not movable from one side to the other of the abdomen. It becomes sensitive usually during menstruation. It is not movable independently of the uterus, unless when of the variety just mentioned. It may attain to an indefinite size also; except that this variety often becomes a fibro-cyst as early at least as it attains to the level of the umbilicus, or soon after. In the case of the ovarian fibroma, all the preceding characteristics are reversed. The sound also shows the uterine cavity to be elongated and more or less misdirected, except in case of the pediculated uterine fibroid.

It is therefore very difficult in many instances to definitely decide the question between a pediculated sub-peritoneal uterine fibroid and an ovarian fibroid. But the latter is very rare, and very seldom attains to a size larger than the middle of the second stage; and therefore but very seldom needs operative interference. In all doubtful cases, therefore, we may wait for time to clear up the doubt, meantime assuming that the case is one of uterine fibroma. If the symptoms indicating the twisting of the pedicle supervene, as in Dr. Van Buren's and Dr. Crane's cases (p. 80), we may then accept the case as one of ovarian fibroma. The differential diagnosis of the other forms is not difficult:

Differential Diagnosis of Uterine Fibroma and Ovarian Fibroma.

UTERINE FIBROID.	OVARIAN FIBROID.
Very common.	Very uncommon.
Tender on pressure.	Not tender, as a rule.
Not movable to opposite side.	Movable to opposite side.
Surface lobulated.	Surface smooth.
Sensibility increased during menstruation.	Not thus increased.
Unlimited size.	Seldom rises to middle of second stage.
Uterine cavity elongated, unless the fibroid is elongated and subperitoneal.	Not elongated.

2. The **mesenteric fibroma**, or fibroplastic tumor of the mesentery, is very rare. I am not aware that such a tumor has been mistaken for an ovarian tumor in more than a single instance—the case of Dr. P. J. Buckner, of Ohio. As the operation for its removal is unique, and one of the most formidable in the history of American surgery, I give its principal points:[1]

> The peritoneal cavity having been opened by an incision nine inches long, it was discovered that the tumor, about the size of a man's head, was in the mesentery between the laminæ of the peritonæum, and surrounded by the small intestines. It was, however, decided, after due consultation, that the operation should proceed.

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[1] *American Journal of Medical Sciences*, October, 1852, pp. 358–360.

An incision was made through the peritonæum, about an inch from the intestine on each side, and parallel with it, which divided numerous small vessels, which bled freely. These incisions were each over twelve inches in length. With the aid of the thin edge of the ivory handle of my scalpel, I separated, rather rudely, the peritonæum and intestine between these incisions, from the fibrous sac of the tumor, to the extent of at least twelve inches. By this procedure the bleeding from the numerous small vessels was prevented. The intestine being now freed from the tumor, I next, in a similar manner, separated the lamina of the peritonæum on either side of the tumor, from the parallel incisions backward toward the root of the mesentery; when, on its posterior surface, I found a considerable branch of the superior mesenteric artery entering the tumor, which supplied its nutrition. This was secured by ligature, divided, and the tumor removed. Several small arteries required to be ligated; the parts were sponged as clean as practicable, the detached intestine was folded as the links of a chain, so as to bring the raw surfaces of the intestine and peritoneal margins in contact, and the omentum majus brought down over it to hold it *in situ*. The abdomen was closed by five interrupted sutures, supported by adhesive strips, covered by compress and bandage, and the lady placed in bed.

The operation was finished in thirty minutes, and was followed by very great prostration, which continued through the day. The patient returned to her household duties in seven weeks, when the wound had healed.

3. **Hæmatocele.**—An accumulation of blood in the pelvic cavity, sometimes rising even to the umbilicus, has been mistaken for an ovarian tumor. It was thus mistaken three times by Boinet. It does not at first give a globular or easily definable or separable mass; but, on becoming encysted, the deception becomes more easy. It appears suddenly, however, in connection with menstruation, and together with symptoms of sudden loss of blood. There is pain in the pelvis, and a feeling of weight in the perinæum. The mass is at first dense, but obscurely fluctuating; afterward it seems solid, coagulation having occurred. Boinet punctured each of his three cases, washed out the cyst, and injected the tincture of iodine, with curative results (p. 202).

4. **Fecal tumor** is preceded by enteritis, or at least by obstinate constipation. There is loss of appetite, and sometimes nausea and vomiting. The abdomen is uniformly distended, tympanites on the side opposite to the tumor, and dulness over it. The small intestines are filled with gas, and there is great

tension of the abdominal parietes. A painful sensation is transmitted through the whole of the large intestine by pressure over the cæcum, which is the usual seat of the accumulation. The vaginal touch shows the mass to be of irregular shape, of a doughy feel, dull at one part and tympanitic at another; and, above all, a depression can be made into it by steady pressure. Large enemata and purgatives diminish or remove the tumor. Sometimes, however, the latter produce fluid discharges only, which pass by the accumulation without removing it. Boinet reports an interesting case (p. 216).

5. **Retroflexion** of the non-pregnant uterus can be mistaken for an ovarian tumor only during the first stage of the latter, so that no injurious results will ensue from such a mistake, except neglect of the proper treatment for retroflexion.

The uterine sound at once removes all doubt.

6. **Carcinoma** of the fundus uteri is extremely rare, though it has sometimes attained to the size of an adult head. The accompanying constitutional symptoms, the loss of flesh, and the fetid discharges, should distinguish this condition from the somewhat more common ovarian fibroma.

7. **Hypertrophy** of the uterus seldom causes the organ to rise out of the pelvis. It may be mistaken for a solid ovarian tumor, but only during the first stage of the latter. A mistake has also been made in the opposite direction.

8. **Floating Kidney.**—Boinet mentions four instances in which ovarian cysts have been mistaken for floating kidney.[1] The following facts are of importance:

1. It is a very rare condition; much more so than is assumed in living subjects, as we may infer from the fact that it is so seldom found after death.
2. The assertion by writers, that it occurs far more frequently in woman than in man, probably rests on the fact that a small ovarian tumor is frequently mistaken for it, and is not confirmed by *post-mortem* examination.
3. It is doubtless congenital.

It is tender on pressure, and sometime nausea is thus produced. It is very movable, and has the peculiar shape of the kidney, easily made out, unless, as sometimes occurs, the hilum looks backward. It can easily be lifted up out of the pelvis, is permanently of the size of the kidney, and produces no symptoms. It may, however, undergo cystic degeneration, though this is very rarely seen, when the diagnosis becomes more difficult. If there is doubt, no detriment can accrue from waiting. We may certainly assume, in any case, that this condition is highly improbable. Having thus disposed of the case, if there be actual enlargement in the abdominal cavity rising from within the pelvis, but without fluctuation, we next turn to such enlargements with fluctuation.

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[1] Page 205.

And the next question, and perhaps the most important of all, is:

QUESTION III.—*Is the fluctuation due to ascites?*

As ascites is more frequently mistaken for a large ovarian monocyst than any other one of the conditions included in the list on page 122, I next speak of its characteristics as distinguished from those of the latter:

1. The history of ascites shows to have existed a chronic peritonitis, or some antecedent or concurrent disease of the liver, lungs, heart, or kidney; or, perhaps, scarlatina. At any rate, it is preceded by ill health. The enlargement of the abdomen is comparatively sudden, and not confined solely to the lower part. If from organic disease of the heart, or kidneys, there soon is anasarca. Anæmia occurs early in ascites, as also dyspnœa on lying down; and diuretics and hydragogues produce temporary relief.

In case of ovarian monocyst, all the preceding is reversed, and for a long time there is no disturbance of the general health.

2. The expression of the countenance is not changed in ascites as in ovarian cystoma. It is not so anxious, and is not emaciated, but, on the contrary, is rather full, sometimes puffy, and of a leaden hue. And there is no emaciation of the neck and upper extremities.

3. If the patient lie upon the back, the anterior surface of the abdomen is flattened in ascites, and is symmetrical. Turning upon the side, the flattening is now also on the sides. On rising suddenly to a sitting posture, the fluid is seen to bulge

forward between and at the sides of the recti muscles, while the prominence at the epigastrium diminishes, and the abdomen protrudes at the lower portion. The changes of form from change of position are less marked if the peritoneal cavity is very much distended.

4. The skin of the abdomen retains its natural aspect in case of ovarian cyst—except that it may be thinned by distention; it is smooth, tense, and shining, from the same degree of intumescence in ascites.

5. The superficial ~~views~~ veins of the abdomen are still more enlarged in ascites than in case of ovarian monocyst; and the floating ribs are not pressed out, so as to give the thorax the peculiar conical shape seen in large ovarian cystomata. The navel becomes very prominent and thin. Œdema of the lower extremities, and at last of the abdomen also, always occurs.

6. Fluctuation is, in ascites, the same on all parts, except the highest, of the surface of the abdomen; and, if the position is changed, it still avoids the highest parts of the cavity, since the fluid gravitates to the lowest parts. In all positions it also has a hydrostatic line of level. It is more clear, and distinct, and resistant, than in ovarian monocysts, and more dull in the latter. In ascites, it is more distinct in the erect position; in case of ovarian cyst, in the recumbent.

EXCEPTION.—If there be very great distention in ascites, the mesentery may not be long enough to allow the small intestines to rise to the top of the cavity while the patient lies upon the back, and fluctuation may exist there also; or the intestines may be glued down by a peritonitis. But deep percussion (percussion with deep pressure) may elicit the tympanitic sound. Cancer of the omentum may prevent the detection of either fluctuation or tympanitic sound on the surface which it underlies.

7. In ascites, percussion gives a clear (tympanitic) sound at the highest portions of the abdominal cavity, whatever the patient's position. In large ovarian monocysts, it gives a dull sound everywhere except over the flanks, whether the patient lie on the back or on the side; i. e., ascites, if the patient lie on the back, is dull in the flanks, and clear in front; an ovarian monocyst is dull in front to the top of the cyst, and clear in the flanks.

EXCEPTION.—One or both flanks may be clear in ascites, from gaseous distention of the colon; but the hydrostatic level of the fluid, in different positions, will, of course, be maintained. Or the intestine may be filled with solid contents, and, therefore, dull, in case of an ovarian tumor.

The value of percussion, in a diagnostic point of view, as applied over the lumbar regions in a case of supposed ovarian cyst, was pointed out by the editor of the London *Medical Times and Gazette*, several years ago;[1] though I have modified his view and given a different explanation of the cause of the clear sound. He had never known this sign to fail: "If, in a case of ascites," he remarks, "the distention is so great that the hydrostatic line of level in front is not changed by posture—and only in case of ovarian cysts so large as to simulate this extreme condition, ought any difficulty [in the diagnosis] to occur—the patient be made to sit up in bed, and the loins be percussed, it will be found that the note is the same (usually dull) on both sides. If an ovarian case, no matter how great the distention, be treated in the same way, one loin will be found to be clear, and the other quite dull. For, in ascites, the air-containing coils of the intestines float as far forward as their mesenteric attachments will permit, while, in the case of an ovarian cyst, they are pushed over to the healthy side. Only entire exclusion of air from the whole tract of intestines could diminish the trustworthiness of this sign. It also indicates with unfailing accuracy on which side the ovarian cyst, if it exist, has arisen." The exception given above should modify the strength of these remarks.

Dr. W. L. Atlee first suggested that the pulsations of the aorta are not felt by placing the hand over the anterior of the abdomen in ascites, while they are transmitted to this surface through an ovarian tumor.

8. By the vaginal touch, fluctuation is detected in ascites at once; in large ovarian cysts it is less distinct, and sometimes cannot be reached at all. The rectal touch easily detects the fluctuation of ascites, and is more liable to feel that of ovarian dropsy. The uterus is often prolapsed somewhat in ascites; and very seldom in case of ovarian tumor without complication.

9. The uterine sound shows the uterus to be in its normal

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[1] June, 1858, p. 574.

position in ascites; unless slightly prolapsed or otherwise displaced by other agencies. It also retains its normal mobility and length of cavity.

10. The fluid of ascites contains albumen, and undergoes a kind of coagulation in twelve to twenty-four hours, if left at rest, and is of a light straw-color. It also contains amœboid corpuscles. The fluid of ovarian cysts differs in these respects, as explained on pages 116, 117.

It might be expected that a removal of all the fluid from the peritoneal cavity would at once decide between ascites and an ovarian cyst. But Dr. McDowell and Dr. A. G. Smith had a patient who had tapped herself with trocar and canula ninety times, in whom, on opening the abdominal cavity to remove an ovarian cyst, they found only a mass of intestines matted together by adhesions.[1]

Ascites is temporarily relieved by hydragogues and diuretics; ovarian cysts are not. The preceding characteristics will generally settle the diagnosis, if the question be between ascites and a large ovarian monocyst. But we may find cases of ovarian tumor together with ascites, in which it is often difficult to detect the former even up to the middle of the second stage. In the third stage there is generally no difficulty. The method for detecting the tumor by percussion and the use of the sound has already been pointed out. A recognized ascites with dulness in front suggests the coexistence of ovarian tumor or of pregnancy (or cancer of the omentum, p. 131). If the history of pregnancy is contradicted by the case, we infer the presence of ovarian tumor, and the preceding methods may demonstrate it. It is, however, sometimes proper to remove the ascitic fluid by tapping, before deciding the proper course to be taken with the ovarian disease.

On the other hand, the existence of an ovarian tumor being recognized, a coexistent ascites of small amount is very likely to be overlooked. Percussion, however, will usually discover the wave of fluid between the ovarian tumor and the abdominal walls, especially at the thinned umbilicus. And if with ovarian tumor we find a prolapse of the vagina from fluid in the Douglas *cul-de-sac,* I think we may be sure the fluid is in the peritoneal cavity, and not in any cyst of the ovarian tumor. I have several times in such cases tapped *per vaginam*, when the ovarian tumor, of course, at once became declared, if it had not been before. Dr. W. L. Atlee thinks the fluid in the peritoneal cavity in some of these cases is derived from the ovarian cyst, and considers his one hundred and twelfth case[1] as an illustration. I have already considered this subject on p. 97, and shown that, when thus produced, ascites does not seriously compromise the prognosis of the case.

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[1] Appendix to Cooper's "Dictionary," p. 10.

The differential diagnosis of ascites and large ovarian cyst may now be stated as follows:

Differential Diagnosis of Ascites and Large Ovarian Cyst.

ASCITES.	OVARIAN CYST.
Previous ill-health.	Good health previously.
Enlargement comparatively sudden.	Enlargement gradual.
Face full, puffy, leaden.	Face emaciated, peculiar.
Patient on back — enlargement is symmetrical, flat in front.	Enlargement is not usually symmetrical, never till third stage; prominent in front.
Patient on the side—flatness on sides.	No change of flatness.
Suddenly rising from the back; fluid bulges between and to the sides of the recti muscles.	Sometimes cyst protrudes thus slightly, if not adherent.
Patient sitting up—abdomen bulges below.	Little, if any, change of abdomen.
Skin of abdomen, smooth, tense, shining.	Abdominal integuments natural, or merely thinned.
On superficial view, abdomen very much enlarged. Œdema of extremities in all cases, and at last of abdomen also.	Superficial view, less enlarged. Œdema only in exceptional cases.
Floating ribs not bulging.	Chest conical from bulging of false ribs.
Navel prominent and thinned.	Navel not thinned.
Fluctuation very decided and clear; diffused through abdomen, but avoids highest parts in all positions, and always has a hydrostatic level.	Less clear and decided, limited by the cyst. May remain at the highest parts; has no hydrostatic level.
More distinct in erect position.	More distinct in recumbent position.

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[1] *American Journal of Medical Sciences*, October, 1870, p. 434.

Percussion gives a clear tympanitic sound at highest portions of abdominal cavity, in all positions. Is dull elsewhere, and changes with the position.	Clear sound only at parts not corresponding to the cyst, and in both flanks; dulness over it in all positions.
Aortic pulsation not felt through abdominal walls.	Pulsations are transmitted through the cyst to the abdominal walls.
Vaginal and rectal touch detect fluctuation at once.	Fluctuations less clear, and may not be reached at all, or not exist in case of polycyst.
Uterus normal in size, mobility, and position; sometimes prolapsed.	Uterus displaced behind the cyst, generally.
Fluid, a light straw-color; coagulates spontaneously; contains albumen and amœboid corpuscles.	Fluid a darker shade; of various hues in polycysts; abounds in albumen or colloid matter. No amœboid corpuscles. Never coagulates spontaneously.
Anæmia supervenes early.	Comes on late.
Hydragogues and diuretics produce temporary relief.	These remedies, as a rule, produce no effect.
Exceptions.—If there be a very large accumulation, may be dulness at highest point of abdominal cavity—patient being on the back. Or the intestine may be glued down. But deep percussion may elicit tympanitic sounds.	*Exceptions.* — May be tympanitic sound in cyst, if it communicate with intestine.
And one or both flanks may be clear, from gas in the colon.	One or both flanks may be dull, from fæces in the colon.

If our investigation of the supposed case of ovarian tumor show it to be not a case of ascites, we next inquire:

QUESTION IV.—*Does the cause of the enlargement arise in the pelvis?*

For, if it does not rise from the pelvis, it is not an ovarian tumor, and therefore the case does not come within the scope of the present inquiry.

If the hand cannot be inserted, by deep and firm pressure, between the tumor and the symphysis pubis, it is to be inferred that the tumor rises from within the pelvis; and, if the vaginal and the rectal touch confirm this inference, it is so decided. Sometimes the history of the case gives a clear affirmative reply to this inquiry. But, on the other hand, it is not to be forgotten that large ovarian cysts sometimes rise completely out of the pelvis.

It appearing that the fluctuating tumor does rise from the pelvis, the next inquiry is:

QUESTION V.—*Is not the tumor a pregnant uterus?*

By assuming, in these circumstances, that pregnancy exists, till its existence is disproved, the mistake, several times committed, of attempting ovariotomy on a pregnant woman who has no ovarian tumor, will be avoided.

In a case of normal pregnancy, taken for an ovarian cyst, reported by Tavignot, a puncture was made with a trocar, which caused an abortion and the mother's death.[1] The following case is related by Boinet:

> "A woman, aged thirty-three to thirty-five years, was admitted into the Hôtel-Dieu, where she remained for some months, having several times been examined by the physician-in-chief and the internes, who decided she had an ovarian cyst. One of the surgeons of the hospital then saw her, and thought to perform ovariotomy, but previously sought my advice as to its propriety. I examined her with reference to that question alone, being thoroughly impressed with the idea, from the statements of my *confrères*, that she had an ovarian cyst. Every thing pointed that way. She was plump, had a fresh color, the mammæ were large and normal in appearance, and she asserted that she had never had a sexual connection, and that the menses had ceased only since she had entered the hospital. The vaginal touch indicated that she was not a virgin, but the cervix uteri was large and prominent, and the abdomen enlarged uniformly to its size at the end of the seventh or eighth month of gestation. She said that pressure on the left side of the abdomen produced pain, and percussion methodically practised gave nowhere on the abdomen the least fluctuation. Palpation detected hard and resistant inequalities and rounded prominences, which, in the absence of all fluctuation, I attributed to fibrous tumors rather than to a multilocular cyst. I was influenced to such an extent by the diagnosis of my *confrères*, who had had the patient for several months under observation, that I did not seek to ascertain by auscultation whether pregnancy existed. I diagnosticated a multilocular cyst, complicated with fibroid tumors, and probably strong adhesions, and consequently presenting only poor chances for ovariotomy. My advice was followed, and the operation adjourned, and quite fortunately for the patient, who, fifteen days afterward, gave birth to a child at full term" (pp. 181, 182).

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[1] Mémoire sur l'Hydropisie de l'Ovaire. *Expérience*, 1840, No. 160, p. 55.

Since, in this case, the enlargement must have extended, fifteen days before confinement, to the epigastrium, and the patient was still plump, and of good color, but nevertheless had had an arrest of menstruation for "several months," even this portion of the history alone excluded the idea of a polycyst far advanced in its third stage, whatever else the case might be.

In the following remarks upon the diagnosis of pregnancy as distinguished from ovarian cystoma, it is assumed that the former has advanced to five and a half or six months at least, so as to correspond with the last part of the second or with the third stage of the latter; as no one would be likely nowadays to attempt to remove an ovarian tumor smaller than a gravid uterus of five and a half months, unless in very exceptional conditions

Negatively it may be stated that, if there be regular menstruation, and no change of the neck of the uterus, or if the patient has passed the menopause, pregnancy of five months or more does not exist.

But, if the cervix uteri is softened and apparently shortened, and the *ballottement* gives evidence of the presence of a *fœtus in utero*, and the fœtal movements are distinctly felt, and the fœtal heart-sounds are clearly recognized by an expert, pregnancy of more than five months exists.

But, if the fœtus be dead, of course only negative results are obtained so far as the movements and the heart-sounds are concerned, and pregnancy may still exist.

The appearance of the mammæ, of the linea alba, and of the vaginal mucous membrane, are not always distinctive of pregnancy, as compared with ovarian cystoma; and the placental murmur is of no value, since a similar sound has, rarely, been heard in the latter also.[1] The umbilical areola is far more distinctive, but is most frequently found, and is more important, in a first pregnancy. The fluctuation of the pregnant uterus, scarcely observable before the fifth month, is afterward more obscure than that of the ovarian cystoma, excepting some polycysts; and, in case there be but a small amount of liquor amnii, it may not be detected at all. In this condition, however, the nodules in the tumor (the limbs and head of the fœtus) are the more distinctly felt. On the other hand, if there be a large quantity of liquor amnii, the prominences just mentioned may not be felt at all, and the fluctuation the more perfectly simulates that of an ovarian monocyst. The history, however, precludes the idea of ovarian cyst, unless the patient has a motive for making a false statement—a contingency for which we are never to be unprepared. A large ovarian cyst has generally already transcended in duration the whole period of gestation; and in pregnancy there is nothing in the expression of the countenance suggestive of ovarian disease.

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[1] Dr. Churchill, in I. B. Brown, p. 59.

If the pregnancy be extra-uterine, it still gives, during the first three months, the history of the pregnant condition, and not of ovarian cystoma. The uterus is itself, however, but slightly enlarged, and is soft. This condition is very rare, and usually declares itself (very certainly if tubal pregnancy) by a rupture of the surrounding structures, or some other unmistakable signs, before the tumor acquires the size of an ovarian cystoma, at the end of the second stage.

Retained encysted fœtus should also be mentioned in this connection; though the stationary condition of the tumor, and the facts obtained by the vaginal touch, with the history of the case, should guard against mistaking it for an ovarian tumor. The duration of the case is often a conclusive element in the diagnosis. An instance is recorded, in the *Edinburgh Monthly Journal of Medical Science*, of an ovarian pregnancy of twelve years' duration with a mature fœtus.[1]

The fact must not be omitted that simple retroversion of the pregnant uterus has been mistaken for an ovarian cyst, since in some instances this condition has continued up to six months without producing a miscarriage. Here we have the history of pregnancy; and the vaginal touch at once shows the cervix uteri to be displaced upward and forward in a characteristic manner.

Pregnancy, together with ovarian tumor, is a complication difficult to diagnosticate (p. 95). The enlarged uterus remains in front of the cyst, and no change of posture brings the latter into such a position that it can be reached, and fluctuation be detected in it. It is not seldom in such cases that a cyst already entering upon the third stage remains unrecognized till after delivery, when it becomes at once apparent. Sometimes an ovarian cyst carries the pregnant uterus so high that the cervix cannot be reached by the finger, and pregnancy being recognized, such an elevation of the uterus should at once suggest the probable cause. Pregnancy being proved to exist, we may wait till the application of the facts already stated also proves the existence of the cyst. On the other hand, the presence of an ovarian cyst being recognized, the existence of pregnancy is generally not difficult to ascertain.

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[1] Vol. xiii., 1851, p. 478.

Molar and hydatidiform pregnancies have also been mistaken for ovarian cyst; Boinet gives the details of three such mistakes.[1] Here the contents of the uterus being the result of an actual conception, most of the symptoms of normal pregnancy obtain; and a mistake in diagnosis, if any occur, should be in that direction, and not incline to ovarian tumor. At any rate, there are generally symptoms not pointing at all to the latter; such as hæmorrhage, or the escape from the vagina of copious watery discharges, or of masses of the uterine contents. The assertion of the patient that she feels the fœtal movements is, in no case, to be implicitly relied on, as all understand; and which was found to be delusive in one of Boinet's cases.

In spurious pregnancy all the physical signs of normal pregnancy are absent.

The differential diagnosis of normal pregnancy at six to nine months, and ovarian cyst in the third stage—omitting the less distinctive signs of the former—may be stated as follows:

Differential Diagnosis of Normal Pregnancy and Ovarian Cyst.

NORMAL PREGNANCY FIVE AND A HALF MONTHS OR MORE.	OVARIAN CYST, SECOND OR THIRD STAGE.
Enlargement sudden and rapid; symmetrical, or inclined slightly to right side.	Enlargement gradual; asymmetrical till in the third stage.
Features natural, healthy.	Features emaciated, anxious.
Superficial veins of abdomen not enlarged. Œdema of ankles not uncommon after seven months.	Veins are enlarged; œdema in late stages, in exceptional cases, one to two years after commencement.
Chest not conical.	Chest conical, if very great distention.

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[1] Pages 190–192.

Fluctuation not very distinct, unless much liquor amnii.	Very distinct, especially in monocysts.
Menstruation arrested.	Not arrested till third stage has commenced.
Vaginal touch detects softening and apparent shortening of the cervix, and enlargement of the uterus.	No change in these respects; but uterus is displaced, usually behind the cyst.
Ballottement feels impulse of fœtus.	No result. Very rarely is imitated.
Fœtal heart-sounds detected.	None.
Movements of fœtus felt.	None.
Enlargement of mammæ.	Occurs in exceptional cases only.
Umbilical areola in first pregnancy.	None.
Has developed within six to nine months.	Has developed within one to three years.
Follicles around the nipple, equally developed in both mammæ; become white on stretching the skin.	Unequally developed, and remain of the same color as the areola.
Exception.—If fœtus be dead, of course, the movements and heart-sounds cease.	

If our investigation justifies the conclusion that neither of the preceding forms of pregnancy exists in the case, we may then inquire respecting other uterine affections; and the next question may be:

QUESTION VI.—*Is there not still an enlargement of the uterus, though it be not gravid?*

The following affections are here suggested:

Enlarged Uterus.	Hæmatometra.	Menstruation Absent.
	Hydrometra.	
	Physometra.	
	Uterine Hypertrophy.	Solid.
	Uterine Fibroma.	
	Carcinoma of Fundus.	
	Uterine Fibro-cyst.	

Hypertrophy of the uterus and carcinoma of the fundus have already been considered (p. 129).

1. **Hæmatometra.**—The causes of accumulation of blood in the uterus, constituting a fluctuating tumor, sometimes rising above the umbilicus, are either congenital or accidental. The former are imperforate hymen, absence of the vagina, or congenital

occlusion of the cervix uteri—the patient never having menstruated at all. The accidental causes are closure of the os uteri and atresia vaginæ, both being almost always consequences of accidents connected with parturition.

Here is amenorrhœa from the first, and intense pain recurs every month from the menstrual nisus. Increase of this tumor is very gradual, and it is tender at the monthly paroxysms.

It is symmetrical, and gives distinct fluctuation.

But the vaginal touch should at once decide if the accumulation be due to either cause, except occlusion of the os uteri. And, if this be congenital, the fact that the patient has never menstruated should direct attention to it; while, if the cause be acquired, the previous history should be equally instructive. But the sound decides this point. Still, Dr. Smellie reports a case in which hæmatometra from imperforate hymen was mistaken, during the monthly access of severe pain, for a case of labor, the bulging membrane being taken by the medical attendant for the "bag of waters."

The general health becomes, in this condition, very much deranged.

2. **Hydrometra.**—Here also the accumulation, in the uterine cavity, of a serous, mucous, or purulent fluid, implies a closure of the genital canal. Of course, if the patient still continued to menstruate, the case would be one of hæmatometra. This occurs, therefore, in old women, after the menopause, and the occlusion is at the os uteri or in the cervical canal. It is due in some instances to the closure which normally occurs in the very aged; the secretion from the lining membrane of the uterus, the endometrium, still persisting.

There is no great derangement of health. The tumor is generally rapidly developed, with the signs of molar pregnancy, is symmetrical, and the fluctuation distinct. It ends spontaneously in the discharge of a grayish and sometimes very fetid fluid. The history in these and the preceding cases should guard us against mistaking them for ovarian cysts. It would be more excusable, perhaps, to take them for pregnancy, as has sometimes been done.[1] Both hæmatometra and hydrometra are of very rare occurrence.

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[1] See a case by Boinet, pp. 193, 194.

3. **Physometra**—or an accumulation of gas in the uterus—may be mistaken for tympanites, but should not be for ovarian cyst, any more than tympanites itself.

It is very rare, and occurs mostly in hysterical women. It is not seldom accompanied by escape of gas *per vaginam.*

Percussion should settle the question at once. If, however, there be much fat upon the abdomen, the tympanitic sound may not be elicited. There is, also, generally, a tenderness over the tumor, which perhaps prevents very thorough percussion, and this tenderness is both suspicious, and suggests that it is not an ovarian cyst.

The vaginal touch finds the uterus light, though so large; it often ascending to the umbilicus, or higher. The idea of pregnancy is eliminated by the normal state of the cervix, as in the preceding condition, and the question is between ovarian cyst and the condition now being considered. The vaginal eructations, and the history of the case, easily decide it.

4. **Uterine Fibroma.**—Although the uterine fibroid is a solid tumor, and has been considered on p. 126, it even more especially demands attention here and in connection with the uterine fibrocyst, since it has so frequently been mistaken for an ovarian cystoma. This is due to a peculiar elasticity in it, which is easily interpreted as an obscure fluctuation. Kœberlé stated, in 1865, that he had known of forty-five mistakes of this kind.[1]

We have to distinguish:

1. Uterine fibroids lying next the endometrium, or projecting freely into the uterine cavity (fibrous polypus).
2. Intramural fibroids.
3. Subperitoneal fibroids; and which often become pediculated and hang freely in the peritoneal cavity.

The fibroid polypus, and the pediculated subperitoneal variety of uterine fibroma, seldom become larger than the fœtal head, and form tumors presenting a smooth surface. They are elastic on firm pressure, and this elasticity is easily mistaken for a deep fluctuation. Indeed, the deception is sometimes so complete that not a few instances are recorded of such solid tumors, which were pronounced to be cystic by all who examined them even after they were removed from the body, till sections were made through them in all directions. Boinet mentions a case in point (p. 173). The last variety is especially liable, however, to a secondary development of cysts, as will appear under the next head.

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[1] "Opérations d'Ovariotomie," Paris, 1865.

The uterine fibroid grows slowly, sometimes becomes stationary for a time, and attains to a large size, without much disturbing the general health, unless it assumes the first form, in which case it deranges menstruation, and finally produces menorrhagia and metrorrhagia. Sometimes only a profuse metrorrhagia is present. Unless the patient is exhausted by such a discharge, the countenance still retains its natural plumpness and expression, and no general emaciation ensues, even though the tumor become as large as the gravid uterus at the end of gestation. The complexion, however, generally becomes coarse and often dingy. Constipation and difficult micturition are not uncommon from pressure downward of the tumor into the pelvis; but the kidneys remain unaffected, the abdominal veins do not become enlarged, nor do the lower extremities become œdematous, unless in exceptional cases.

The tumor is somewhat tender under pressure, especially during the catamenial period, and the second variety usually presents a lobulated surface, as is less frequently the case with the third variety. The last variety alone is symmetrical. A light, quick percussion does not develop the pseudo-fluctuation before alluded to, but pressure does.

Per vaginam the uterus is found enlarged and heavy in the first two forms, yet certainly not from pregnancy, since the menses have not ceased to appear. Sometimes the tumor is felt to be continuous with the tissue of the cervix. The sound passes into the cavity to the depth perhaps of four, six, or even eight or ten inches. In case of polypus the sound may be carried around the tumor. In the third variety, however, neither the touch nor the sound may give any positive information of the relations of the fibroid to the uterus. In the first two varieties, it will show also that the uterus cannot be moved independently of the tumor; but, in the third variety, it often occurs that each can be freely and extensively moved, without disturbing the other. Of course, it is only while the fibroma is small (the size of the fœtal head, or less) that this freedom of motion can be imparted to it, while the uterus is held at rest upon the sound. The rectal touch will often discover a characteristic lobulated surface on the lowest portion of the tumor.

But, if doubt yet remains—it still being thought probable that the case is one of ovarian cyst—it has been advised to tap the tumor with a full-sized trocar in the way of further exploration. And it is a fact of no small practical interest, that no serious consequences usually result from thrusting a large trocar into a uterine fibroid. Boinet mentions a case which had been mistaken for an ovarian polycyst by the physicians and surgeons of the Necker Hospital, Delpech with the rest, and in which he made three successive punctures in different parts of the tumor, and each without result, before the medical gentlemen present would relinquish the idea of fluctuation, and consequently of an ovarian cyst (p. 175). Boinet himself has often resorted to this means of completing the diagnosis, without serious results, and remarks that the sensation communicated to the hand of the operator is quite distinctive of the fibroid tissue. He has operated, in two instances, upon patients believed to have ovarian polycysts, who actually had uterine fibroids, and who died respectively of supervening hæmorrhage, and of peritonitis (p. 174).

Well may we admit the difficulty of diagnosis when so experienced a diagnostician is found at fault, and may understand why he would afterward advise the use of the trocar before commencing the operation of ovariotomy.

Puncture of a uterine fibroid has, however, in some instances, proved to be not a harmless procedure. Peritonitis and death have occasionally been its consequences. The best one can say, perhaps, is, that it does not often kill. It were well, therefore, to avoid it. And generally the small instrument which I have recommended (p. 116) will give all the information in this direction which is required; for with it also the sensation conveyed to the hand is equally distinctive.

It will be seen that the third form of uterine fibroid—the subperitoneal pediculated fibroma—is the most difficult to distinguish from an ovarian cyst,[1] since the sound shows the normal depth of the uterine cavity, and that the tumor can be moved independently of the uterus, and *vice versa*, while the elasticity, before described, suggests a deep fluctuation. I have myself (in September, 1853) attempted ovariotomy in such a case, supposing I had to deal with an ovarian monocyst somewhat smaller than the fœtal head. Even when the tumor was brought into view, and again tested, myself and others were still assured of fluctuation; but, on using a small trocar, no fluid, except a few drops of blood, issued. For reasons assigned in the report of the case,[1] I removed the tumor with the body of the uterus. The patient died on the eighth day, of gangrene of the small intestine, occasioned by strangulation, a portion of it having been forced, by violent coughing, through the abdominal incision between two of the needles used to close it, and where it remained six hours before I could arrive and return it. At the *post-mortem* examination the parts concerned in the operation were found in the best possible condition for recovery.

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[1] Mr. Lizars, in his second case, mistook a uterine fibroid for an ovarian cyst.

I know of no means of a certainly correct diagnosis in another precisely similar case. I did not, however, attach sufficient importance to the fact that the tumor was somewhat sensitive on pressure, and on the whole produced far more discomfort than an ovarian cyst of that size should produce. Another mistake was in operating upon an ovarian cyst of that size under any circumstances but the most exceptional. When it had attained to the size of an ovarian cyst in the third stage, the history of the case, and subsequent changes, would very probably have given substantial grounds for a correct diagnosis.

The uterine fibroid is very common in the negro race. Very few women die above the age of forty years, at the Home for Colored Women in this city, who are free from this disease.

Differential Diagnosis of Uterine Fibroma and Ovarian Cyst.

UTERINE FIBROID.	OVARIAN CYST, THIRD STAGE.
Slow growth.	More rapid growth.
Natural expression, even if large.	Changed expression.
Complexion darker and coarser.	Paler, and thinner.
General health good. No emaciation.	Health impaired. Emaciation.
Abdomen very asymmetrical.	More symmetrical.
Abdominal veins not enlarged.	Enlarged; especially if a polycyst.
Action of kidneys normal.	Kidneys inactive.

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[1] *American Journal of Medical Sciences*, April, 1855, p. 393.

No amenorrhœa. Menorrhagia often.	Amenorrhœa.
Tender on pressure; more so during menstruation.	No tenderness.
Elasticity marked; no true fluctuation.	Fluctuation distinct.
Surface lobulated and firm.	Smooth, except polycysts; yielding.
Per vaginam, tumor is dense and firm, and often continuous with uterus, which is large and heavy.	Compressible, fluctuating, detached from uterus, which is normal.
Uterus moves with tumor.	Does not thus move.
Uterine cavity elongated.	Not elongated.
Tapping gives negative results.	Positive results (exceptions on p. 116).
Exception.—In case of the subperitoneal pediculated variety, size of the fœtal head, the uterine cavity may be normal, and the tumor be moved independently of the uterus.	

5. **Uterine Fibro-cystoma.**—If we follow the development of the preceding new formation—the uterine fibroma—we find that cysts are liable to be developed in it as a secondary formation. We then have one of the forms of the fibro-cystic tumor of the uterus (p. 105).

Recognized as a distinct class of tumors but a few years since, and first described by Cruveilhier, they have frequently been mistaken for ovarian cysts by the ovariotomist. Sometimes they have even been removed as ovarian cysts, and the mistake discovered only by a subsequent examination of the mass removed, or by a *post-mortem* investigation, which showed both ovaries to be in the normal condition.

Commencing as a uterine fibroid, and presenting the signs specified under the preceding head (and on p. 106), at length the growth seems more rapid, and fluctuation, before suspected, now becomes very evident, and even unmistakable. The tumor has commenced on the third stage before this sign is very clear, and is for a time afterward generally asymmetrical. Sometimes several distinct cysts are easily made out, and, if the same sensation is communicated *per vaginam*, the resemblance to an ovarian cyst, so far as most of the physical signs are concerned, is quite complete. Especially, if the cystic transformation has occurred in a pediculated subperitoneal fibroma, is the resemblance confirmed, for then the sound will show the normal depth of the uterine cavity. I have myself made a diagnostic error in these circumstances.

An explorative tapping, if the cyst enlarges so as to impair the general health, might be expected to clear up the diagnosis. The fluid obtained is generally darker than that obtained at first from an ovarian oligocyst, but exactly resembles that often found in polycysts. Sometimes, however, the fluid is light-colored, but almost always more or less opaque, and contains less albumen than that of an oligocyst or monocyst (p. 106). The microscope only gives negative testimony in respect to the differential diagnosis.

Mr. I. B. Brown remarks that he knows of no distinguishing signs between uterine fibro-cyst and ovarian cystoma (p. 56). I have myself (in February, 1868) operated for the removal of an ovarian oligocyst in a case of uterine fibro-cyst, and this, even after a tapping by which I removed from the principal cyst forty pounds of a brownish fluid. I did not recognize my mistake till after I had made the abdominal incision, and introduced the hand to settle all doubt. I, however, found the mass (in all weighing fifty pounds) attached by a pedicle one inch in diameter, and a quarter of an inch long only, to the fundus uteri, and removed it. The patient still enjoys perfect health.[1]

It is in view of such cases as these that it has been recommended to make an explorative abdominal incision (one to two inches long), and thus ascertain the nature of the tumor. And this has generally been safely done. Dr. F. Bird was much in the habit of completing the diagnosis in this way. It is, however, sometimes exceedingly difficult, even with the hand in the abdominal cavity, to distinguish an adherent uterine fibro-cyst from an adherent ovarian cystoma. On the other hand, exploratory incisions have not very seldom proved fatal, as will farther on be seen. Without recommending this course, therefore, except with the limitations hereafter to be specified, I commend it as always safe, in any doubtful case, to assume, even after commencing the operation of ovariotomy, that it is one of uterine fibro-cyst, till the operation has progressed far enough to decide that point.

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[1] An abstract of this case is to be found in the *American Journal of Obstetrics*, August, 1870, p. 308.

Kœberlé has stated that the uterine fibro-cyst very rarely occurs before the age of thirty years, though two cases of the nineteen of removal of this kind of cyst, reported by Dr. C. C. Lee, were exceptions to this assertion. He thinks, however, that the uterine fibro-cyst should generally be clearly diagnosticated during life, as he himself alone had thus far done in a single case, before he commenced the operation for its removal.[1] T. S. Wells stated, after he had operated on one hundred and thirty tumors supposed to be ovarian, and had removed one hundred, that he "knew of nothing but a rather darker, less pearly-blue aspect of the tumor, which would put the surgeon on his guard" against mistaking it for an ovarian cyst, after making an exploratory incision.[2]

I think the following statement includes the points available up to the present time, for the differential diagnosis of the cyst under consideration, and the ovarian cyst.

Differential Diagnosis of Uterine Fibro-cyst and Ovarian Cyst.

UTERINE FIBRO-CYST, THIRD STAGE.	OVARIAN CYST, THIRD STAGE.
Occurs after thirty years, almost always.	Occurs earlier than thirty years, as well as later.
Slow growth at first. Rare.	More rapid, and more common.
Expression good, till very large.	Expression characteristic (p. 110).
Complexion dark and injected (facies uterina), sometimes florid. No emaciation.	Pale. Emaciation.
General health for a long time good.	Has failed by end of second stage.
Abdominal veins not enlarged.	Enlarged.
Umbilicus not prominent.	Umbilicus prominent.
No amenorrhœa. Menorrhagia seldom.	Amenorrhœa.
Kidneys normal.	Kidneys inactive.
Tender on pressure at first.	Not tender.
Elasticity, then evident fluctuation.	Fluctuation throughout its course.
Surface lobulated at first; may remain so.	Not lobulated, except in polycysts.
Cyst-wall of livid hue, very vascular.	Cyst-wall of lighter color, less vascular.
Per vaginam, firm at first. Often continuous with uterus.	Fluctuates. Not continuous with the uterus.

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[1] *Gazette Hebdomadaire*, 1869, No. 16.

[2] "Diseases of the Ovaries," vol. i., p. 362.

Uterus moved with tumor, if at all.	Independent of tumor.
Uterine cavity elongated, generally.	Not elongated.
Fluid, yellow, serous, with little albumen, or fibrinous, like lymph, and spontaneously coagulable. But it may be dark brown, or hæmorrhagic.	Light in monocysts not before tapped; highly albuminous; sometimes colloid.
Exception.—If the fibro-cyst be a subperitoneal outgrowth, the uterus may be moved independently of it, and its cavity is not elongated.	

To the preceding view of the differential diagnosis of ovarian tumors, and uterine fibroma and fibro-cystoma, I add the following extract from Mr. T. S. Wells's remarks appended to the report of his fourth series of one hundred cases of ovariotomy, as being of great practical value, though they do not discriminate between the two forms of uterine tumors just mentioned:

I. EXAMINATION OF THE ABDOMEN.

Inspection.—1. Visible enlargement of the abdomen is more often *general* in cases of ovarian tumor, and *partial* in cases of uterine tumor, being confined to the lower part of the abdomen until a very large size has been attained.

2. The depression of the umbilicus is diminished, or the umbilicus may become prominent, in large ovarian cysts. This is rarely seen in uterine tumors unless fluid is also present in the peritoneal cavity.

3. Enlargement of the superficial veins of the abdominal wall, and œdema of the abdominal wall and of the lineæ albicantes, are more general in uterine than in ovarian tumors of moderate size, but are not uncommon when ovarian tumors have attained a very large size.

4. When the abdominal wall is thin, both uterine and ovarian tumors, if not very closely adherent to the abdominal wall, may be seen to move downward as a recumbent patient inspires, and upward during expiration, falling downward and forward as she sits or stands, and more or less to either side, according to the inclination of her body. But nearly all uterine tumors, though visibly moving above, seem to be fixed below in the hypogastric region.

5. When a recumbent patient attempts to sit up without aid from any other than the abdominal muscles, the recti are seen to bulge forward in front of a tense, non-adherent ovarian tumor, or with a flaccid, adherent cyst. This is seldom well marked in uterine tumors, a solid mass fixed centrally below the umbilicus interfering with the free action of the recti.

Measurement.—Increase in the circular measurement of the abdomen is usually greater on one side than the other in ovarian tumors. In uterine tumors the increase is often more symmetrical. In both classes, vertical measurement shows the distance between the pubes and the sternum to be increased. But very great proportionate increase of the space from the pubes to the umbilicus is more common in uterine than in ovarian tumors.

Palpation.—1. Large masses of apparently solid matter, and smaller masses or nodules of very hard or bone-like substance, are sometimes observed in ovarian tumors. But it is excessively rare to find such solid portions *preponderating* in an ovarian tumor. As a rule, the fluid or cystic portion is the larger, the hard or solid portion the smaller, in ovarian tumors. In uterine tumors, on the contrary, the solid is the larger, the fluid the smaller portion.

2. The mobility of ovarian tumors is generally greater from below upward than that of uterine tumors, unless the latter are distinctly pediculated. If one hand be pressed backward between the tumor and the pubes, an ovarian tumor can generally be raised considerably, and the hand can sometimes be pressed backward almost to the brim of the pelvis; while a tumor which involves the body and neck of the uterus cannot be raised at all, or only with difficulty, and the hand cannot be pressed down between the pubes and the tumor.

3. When there is fluid free in the peritoneal cavity, and a hard tumor can be felt on displacing this fluid by sudden pressure, the tumor may be either uterine or ovarian. If the tumor be very hard, and the quantity of fluid small, the tumor is probably uterine, and the fluid ascitic. An ovarian tumor which has given way, and emptied one or more of its cysts into the peritoneal cavity, is seldom hard or well defined in outline, and the quantity of fluid is often so large that the size and shape of the tumor cannot be ascertained until after removal of the fluid by tapping. The characters of the fluid will then complete the diagnosis.

Percussion.—As percussion elicits a dull sound all over both uterine and ovarian tumors, which dulness ceases abruptly at the border or outline of the tumor in all positions of the patient—except in the rare cases where a cyst contains gas, or where a coil of intestine is adherent in front of a tumor—percussion cannot afford much aid in distinguishing ovarian from uterine tumors.

Auscultation.—In ovarian tumors the impulse from the aorta is often perceptible, and a sound sometimes accompanies the impulse. The sounds of the heart are rarely transmitted, and any distinct vascular murmur is excessively rare. But, in about half the cases of uterine tumors which I have examined, some variety of vascular murmur may be heard. In some cases the murmur is tubular, in others vesicular, and sometimes a tubular and a vesicular murmur may be heard in different parts of a uterine tumor. These murmurs are synchronous with the pulse. They may vary in intensity with the amount of pressure by the stethoscope, and may disappear on very firm pressure. Common in uterine, very rare in ovarian tumors, vascular murmurs are valuable aids in diagnosis.

II. EXAMINATION OF THE PELVIS.

1. **Examination of the vagina** may at once remove all doubt, by showing that the os and cervix uteri are in a healthy state, that the uterus is normally mobile, that its cavity is neither elongated nor shortened, and that any tumor felt through the vaginal wall is independent of the uterus. In such a case the tumor is almost certainly ovarian. On the contrary, we may find the vagina more or less completely obliterated by a solid mass, the cervix uteri gone, the os reached with difficulty, the cervical canal so closed or distorted that the sound cannot be passed, or the uterine cavity so enlarged that the sound may pass many inches beyond the normal length. Here the tumor is almost certainly uterine.

But it must be remembered that considerable peritoneal outgrowth, or large growths within the walls of the fundus or body of the uterus, have been observed, while the uterine cavity has remained unaltered in dimensions and the cervix in structure; and, on the other hand, the cervix may be drawn up out of reach, or the whole uterus may be elongated, when the connection with an ovarian tumor is close; or the lower portion of an ovarian tumor may be so moulded to the true pelvis that the uterus is pressed upward and forward, or flattened behind the pubes, so that the tumor and the uterus are either really or apparently inseparable from one another. Abnormal arterial impulse in the vagina and cervix uteri may be felt in both classes of tumors. But I have never felt the vascular thrill like that of varicose aneurism, occasionally felt in the lower segment of a fibroid uterus, in an ovarian tumor.

The vaginal walls may be so depressed, when there is much fluid free in the peritoneal cavity surrounding either a uterine or an ovarian tumor, as to form a vaginal rectocele, and the uterus may either remain above the brim of the pelvis if greatly enlarged, or if fixed by adhesion; or it may prolapse with the vagina, the os appearing at the most depending part of the protrusion. Here the uterine sound will generally remove all doubt; for, if the dimensions of the uterine cavity are normal, and the weight of the uterus is not increased, the tumor can hardly be uterine. And a uterus which is not much enlarged can generally be pushed up to its normal situation.

In some cases where the uterus is much elevated, it may be felt through the abdominal wall above the pubes, while the os uteri cannot be reached by the vagina. The urethra may be elongated or drawn to one side, and the bladder may also be displaced. If the abdominal tumor and the pelvic portion of the tumor fluctuate, while the uterus does not much exceed its normal dimensions, it is almost certain that the uterus is adherent to, and is elevated by, an ovarian tumor.

2. **Examination by the rectum** may show that the uterus preserves its normal size, shape, and position. Or it may be displaced by some tumor above or in front of it, and one or both ovaries may sometimes be felt. This, however, is not very common, if they are not enlarged, nor

lower in the pelvis than usual. By one finger in the rectum and another in the vagina, the consistence, form, and size of any intervening structure can be ascertained, and valuable information so obtained; and if the sound be passed into the uterine cavity, and examination then be made by the rectum, it is often easy to ascertain whether any solid or fluid tumor is situated between a normal uterus and the rectum, or whether the uterus is fixed and its posterior part enlarged.

When a tumor can be felt in the pelvis by the vagina and rectum, as well as in the abdomen by the abdominal wall, simultaneous examination will be required to ascertain if there is more than one tumor, and if the uterus is independent or not. Pressing one finger firmly on the cervix uteri, and moving the abdominal tumor with the other hand from side to side, then upward and downward, the uterus may be felt to remain almost unaffected by the movement of the tumor, or only to receive some transmitted movement as the pelvic portion of the tumor moves. Here the strong probability is that the tumor is ovarian. On the other hand, every movement of the abdominal tumor may be communicated immediately to the uterus, which is felt to move in all directions with the pelvic portion of the tumor. If this is solid, it is almost certain that the tumor is uterine.

QUESTION VII.—*Is not the fluctuation due to a distended bladder?*

A case is narrated by Dr. Gooch, in which a distended bladder in a pregnant woman was mistaken for an ovarian cyst; and, in the attempt to tap it, the trocar was thrust through the abdominal walls into the uterus, and into the head of the fœtus.

The history of the case should of course prevent such a blunder. There is also dulness in such a case, in both flanks, and the catheter at once clears up the diagnosis. The fact, however, that the patient supposes that she has passed urine freely, might mislead. In a case reported by Dr. G. Hewitt,[1] the tumor had existed three weeks, and was not tender nor fluctuating, but quite hard. The patient stated that she had freely passed urine during all this time. The case had been regarded as one of rapidly-developed ovarian cyst, since Kiwisch had seen one increase from the size of the fist to that of the head, in two or three weeks. The catheter, however, drew off six pints of urine, and the tumor disappeared. I. B. Brown also records another case (p. 63), in which this instrument gave a similar solution of the difficulty. The force of the axiom, that the diagnostic examination of an abdominal tumor should commence with the use of the catheter, is illustrated by this class of cases.

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[1] "Diseases of Women," p. 343.

Finding that our case is not one of distended bladder, we next inquire:

QUESTION VIII.—*Is the fluctuation due to any of the following conditions?*

1. Serous Cyst of Broad Ligament.
2. Encysted Dropsy of Peritonæum.
3. Dropsy of the Fallopian Tube.
4. Renal Cyst.
5. Hepatic Cyst.
6. Pelvic Abscess.
7. Splenic Cyst.

1. **Serous Cyst of Broad Ligament.**—The serous cyst of the broad ligament is rare compared with ovarian cyst, is of slow growth, and occurs most frequently in young persons. Before tapping, it is almost invariably taken for the ovarian cyst. Unlike the latter, it is generally cured by a single tapping, and therefore does not demand extirpation, though exceptional cases occasionally occur.

This form of cyst may continue a long time without derangement of the general health, and is seldom fatal. Its differential diagnosis may be stated as follows:

Differential Diagnosis of Cyst of the Broad Ligament and Ovarian Cyst.

SEROUS CYST OF BROAD LIGAMENT.	OVARIAN CYST—THIRD STAGE.
Very slow growth; rare; always monocystic.	Common; growth more rapid; two forms of cystoma.
Mostly in young persons.	Occurs at all ages.
Expression natural; not much emaciation.	Expression changed; emaciation.
General health slightly impaired—though in third stage.	Decidedly impaired.
Abdominal veins less prominent.	Veins more developed.
Fluctuation remarkably distinct.	Less distinct.
Uterus lies low, generally.	Not depressed, but behind tumor generally.
Per vaginam, fluctuation very clear.	Less clear.
Fluid contains no albumen, and is clear as spring-water. (Specific gravity 1005.)	Contains much albumen, and is not perfectly transparent. (Specific gravity 1015 or more.)
Scarcely ever fills after tapping.	Fills again after tapping.
Very seldom fatal.	Almost always fatal at last.

Subperitoneal and omental serous cysts are also, very rarely, met with. Their early history alone can distinguish them from the cyst just described. And this and the characteristics of the contained fluid should distinguish them from ovarian cysts. The following case was, however, mistaken for an ovarian cyst, and ovariotomy was commenced. It is reported in *The Lancet* for 1864, p. 500:

The patient was placed under the influence of chloroform, an incision was made below the umbilicus, and the sac, or what appeared to be the sac, come down upon, and was separated by the hand for a short distance around. It was now punctured with a trocar, and several pints of clear, serous-looking fluid removed. On opening up this sac, it was found to be, not the wall of an ovarian cyst, but the parietal peritoneum, infiltrated with solid material, which thickened and raised its internal surface into nodular elevations. The omentum was greatly enlarged, and studded with, or rather made up of, clusters of hydatid-looking growths, which varied in size from the size of swan-shot to that of a grape. Some of these were cystic, and contained a clear fluid; they could be most readily detached from their points of attachment. A mass of these nodules, connected with the omentum, was seen lying in the right iliac fossa, and produced the enlargement which had been diagnosticated as a collection of cysts contained in the pedicle of the ovarian cyst. The operation was now quickly brought to a termination by closing the abdominal incision by several hare-lip pins and metallic sutures. Syncope and vomiting set in shortly after the operation, and continued until the evening, at which time these symptoms disappeared, and she was enabled to obtain a few hours' sleep, and afterward take some milk and arrow-root. She never thoroughly rallied, but gradually sank, and expired fifty hours from the time of operation. Her relatives would permit no examination of the body to be made.

The grape-like bodies on subsequent examination were found to consist of globular cysts, of the color of fat, and were aggregated in masses as if thirty or forty grew from a common point or centre. The interior contained a clear watery fluid, which would not coagulate when heat was applied, though the fluid from the abdomen did coagulate on the application of that test. The walls of the cysts were tough, and curled inward. On scraping the interior, and placing the *débris* under a microscope, an abundance of large, circular, nucleated cells could be seen, as well as numerous spindle-shaped ones.

For the following case of serous cyst of the broad ligament I am indebted to Dr. J. C. Nott, of New York:

Mrs. D., aged twenty-seven, lymphatic temperament, lived in a malarial region in Alabama, and had suffered much from intermittents.

She called on Dr. Nott in Mobile, in 1863, having a tumor which he diagnosticated as a unilocular ovarian cyst, arising from the left side. He tapped her in November of that year, drawing off about two gallons of limpid fluid, not tested. In August, 1865 (about twenty months later), she again visited him, presenting much the same appearance; was again tapped, and about the same quantity of limpid fluid drawn off. Two months after this tapping, she was married, and in May, 1867, had a healthy female child, which is still living. In August, 1868, she had an abortion at about six weeks, previously to which she had noticed some swelling, but only for a short time. This swelling increased, and she came to New York, where Dr. Nott successfully removed the cyst in October, 1869, since which time she has enjoyed good health.

The cyst was balloon-shaped, without adhesions, perfectly smooth, very slightly vascular, and with a long, membranous pedicle. The cavity of the cyst extended down with so sharp an angle into the latter that the ligatures first applied were found to include about one inch ot the cyst; and three others (silver wire) were then applied lower down, and the part above removed.

2. **Encysted Dropsy of the Peritonæum.**—This is an extremely rare pathological condition, and occurs more seldom in women than in men. I have myself met with but two instances, one in each sex. Boinet has seen two cases in men and one in a woman (p. 169). It is preceded and produced by peritonitis. The fluid lies above (in front of) the intestines, the latter being bound down by adhesions; and sometimes extends over the whole anterior aspect of the abdomen, being divided into several divisions, while in other cases it is bounded by narrow limits. Depressions /are sometimes felt on the surface corresponding to the dissepiments, if there be any. The abdomen is not prominent, but flat. Fluctuation is weak and limited, and does not change its relations on changing the position of the patient. It does not interfere with respiration or digestion, like an ovarian cyst, and is never attended by œdema of the lower extremities, or enlargement of the abdominal veins.[1]

Differential Diagnosis of Encysted Dropsy and Ovarian Cyst.

ENCYSTED DROPSY.	OVARIAN CYST—THIRD STAGE.
Is extremely rare. Slow increase.	Common, and grows rapidly.
Preceded by attack of peritonitis.	Preceded by good health.
Features natural. Health not bad.	Features peculiar. Health impaired.
No dyspnœa, or deranged digestion.	Both are decided symptoms.

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[1] Mr. T. S. Wells made an exploratory incision in a case of this kind, and evacuated the fluid. The patient recovered.—"Medico-Chirurgical Transactions," vol. liv., case 5, of exploratory incisions.

Abdomen not prominent, at points even depressed.	Everywhere prominent.
Veins not enlarged, nor lower extremities œdematous.	Veins enlarged. Extremities not very seldom œdematous.
Fluctuation not strong; limited in extent, fluid being in front of intestines.	Fluctuation decided. Intestines on sides of cyst.
Per vaginam, no tumor felt; and generally no fluctuation.	Tumor felt, and fluctuation.
Uterus in place; sometimes fixed by adhesions.	Behind tumor, generally.
But little fluid obtained by tapping.	Larger quantity obtained, or very large.
Fluid has characters of ascitic fluid, and flakes of fibrine.	Has other characters; no flakes unless there has been inflammation of the cyst-wall.

It should be added that acute tubercular peritonitis may simulate an ovarian or other form of abdominal tumor.

3. **Dropsy of the Fallopian Tube (Hydrosalpinx).**—This form of dropsy is exceedingly rare, always monocystic, and of slow development to a size requiring surgical interference (p. 102). The tumor, lying in the iliac region, feels at first like a convolution of intestine; does not for a long time impair the general health; and, in some instances, the fluid escapes at intervals *per uterum et vaginam*. This is, indeed, its most characteristic sign. We must rely mainly on the history of the case; for, when the cyst has attained to the third stage, it may be impossible to distinguish it from an ovarian monocyst. It refills very slowly after tapping; its fluid contains mucus, and but little albumen, and usually resembles that of the uterine fibro-cyst more than that of an ovarian cyst. Its most striking points for the differential diagnosis are the following:

Differential Diagnosis of Hydrosalpinx and Ovarian Cyst.

DROPSY OF FALLOPIAN TUBE.	OVARIAN CYST—THIRD STAGE.
Very rare; convoluted at first; monocystic.	Not rare, nor convoluted; two forms.
Of very slow growth; probably eight or ten years at least.	Rapid growth.
Health not early impaired.	Much sooner impaired.
Fluid at intervals discharged *per vaginam*. It is generally clear, but varies; contains mucus.	Not thus discharged. It contains albumen, but no mucus.
Refills slowly after tapping.	Fills rapidly.

4. **Renal Cyst.**—If a correct history of a renal cyst can be obtained, it should exclude the idea of an ovarian cyst, since it arises in the lumbar region and extends *downward* toward the pelvis. Dr. Bright also remarks that it grows more in front than toward the loins. Moreover, some symptoms pointing to the kidney, as albuminuria, low specific gravity of the urine, alkalinity, etc., have usually been at some time discernible. But when the whole of one kidney has been invaded by the cystic degeneration, the urine, in case the remaining kidney is still healthy, is perfectly normal. Indeed, it has been found that even cancer of the kidney when projecting into the ureter may not give off cancer-cells to be detected in the urine.

Mr. T. S. Wells reports a case of large hydronephrosis which he mistook for an ovarian cyst, and attempted to remove, but did not succeed. There was no albumen, and the urinary deposits were simply urates, mucus, and epithelium. The cyst had been tapped, and yielded a fluid resembling pea-soup. The patient died, comatose, thirty hours after the operation.[1] He reports two other cases of renal cysts in which a correct diagnosis was made by the use of the exploring trocar, and a microscopic examination of the fluids obtained.

A case was presented to the Academy of Medicine (Paris) by M. Béhier, of a large renal cyst which was mistaken for an ovarian cyst, and tapped twice. No attempt was made, however to remove it, and after death both ovaries were found to be healthy.[2] Dr. Schnettelig also reports a case,[3] in which a similar mistake was made, and the cyst, a very large one, removed, and the patient died on the second day. She was born with a large abdomen. "The swelling increased until the seventh year. At that age, and three years afterward, she fell on the abdomen, suffering each time from vomiting, bloody urine, and other inflammatory symptoms. Menstruation appeared in the nineteenth year, and was regular. The swelling had increased rapidly during the last three years. She had been tapped twice. From the history of the case, a tumor of the kidney was at first diagnosticated, but the swelling was afterward supposed to be an ovarian cyst, especially on account of the chemical constituents of the cyst-fluid (cholesterine, a large quantity of paralbumen, chlor-alkalies, and phosphates). The error was discovered at the *post-mortem* examination." Dr. H. C. Rose reports a similar error in diagnosis in the fifty-first volume of the "Medico-Chirurgical Transactions" (1868). I also committed a similar mistake in April, 1868, except that in my case a solid renal tumor was found. It was removed, and the patient died of peritonitis fifty hours after the operation. In this case the tumor, nearly as large as the adult human head, gave pseudo-fluctuation, like that of a uterine fibroid (p. 144), and which had deceived several of the most distinguished physicians and surgeons of this city, all of whom concurred in pronouncing the case one of ovarian cyst. Even after the mass was exposed this idea was confirmed. The tumor was tapped with a negative result, after which I decided to remove it—the whole organ being implicated in the disease. No coma supervened, and the secretion of the remaining kidney continued copious till death. Here was no history of any antecedent kidney-affection, and no abnormal condition of the urine could be detected.

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[1] *Dublin Quarterly Journal*, February, 1867, pp. 139, 140.

[2] Ranking's "Abstract," January, 1867, p. 257.

[3] *Archiv. für Gynækol.*, 1870, p. 415.

An hydatid cyst of the right kidney was mistaken for ovarian tumor by Spiegelberg, and removed, with a fatal result.[1] The use of the exploring trocar and the microscope, which would have determined the real nature of the case, was omitted by an oversight, since he is an expert in those methods of diagnosis in such cases.

Prof. Simon, of Heidelberg, has successfully removed a diseased kidney in two instances,[2] and recently this has been done successfully by Dr. J. T. Gilmore,[3] of Mobile, Alabama.

It is an interesting fact that the floating kidney sometimes becomes much enlarged by disease, cystic or otherwise, thus increasing the difficulty of diagnosis. Such a case was reported in *The Lancet* (English edition) for March 18, 1865.

I here reproduce the points of the diagnosis of renal cysts which may guide us in distinguishing them from ovarian cysts, as stated by Mr. Wells:[1]

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[1] *Archiv. für Gynækol.*, 1870, p. 146.

[2] First case, see *Journal of Gynæcological Society of Boston*, July, 1870, p. 22.

[3] *American Journal of Obstetrics*, May, 1871, p. 75.

1. Although intestine is sometimes found in front of ovarian tumors, and sometimes behind movable renal tumors, these are very rare exceptions to the general rule that renal tumors press the intestines forward, and ovarian tumors press them backward. In other words, ovarian tumors are in front of the intestines, renal tumors are behind the intestines.

2. Large tumors of the right kidney usually have the ascending colon on the inner border of the tumor. Tumors of the left kidney are usually crossed from above downward by the descending colon.

3. The discovery of intestine in front of a doubtful abdominal tumor should lead to a careful examination of the urine. It is possible that one kidney may be diseased and the urine quite normal, because the healthy kidney alone secretes urine. But the rule is, that either pus, blood, or albumen, or characteristic epithelium, is detected—or some history may be elicited of its being detected at some former period.

4. If any doubt be entertained whether a substance felt between an abdominal tumor and the integument be or be not intestine, percussion may not solve the doubt, because the intestine may be empty and compressed. But (*a*), an intestine when rolled under the fingers contracts into a firm, cord-like, movable roll; (*b*), the patient may be conscious of the gurgling of flatus along it, or the gurgling may be heard on auscultation; (*c*), the intestine may be distended by insufflation after passing a long elastic tube through the rectum.

5. Ovarian and renal cysts may both be subject to great alterations in size. When the kidney is the seat of disease, the fluid usually escapes by the ureter and bladder. An ovarian cyst can only empty itself through the bladder after adhesion and a fistulous opening. It may discharge through the Fallopian tube and uterus, or into an intestine, or through the coats of the vagina. In either case the physical and chemical characters of the fluid discharged will be the chief guide in diagnosis.

6. If a correct history can be obtained, it may be expected that a renal tumor has first been detected between the false ribs and ilium, and that it has extended first toward the umbilicus, next into the hypochondrium, and lastly, downward toward the groin. An ovarian tumor has, in all probability, been first noticed in one inguinal or iliac region, and has extended upward and inward.

7. It is only a very small ovarian tumor, with a long pedicle, which could be mistaken for a floating or movable kidney. The latter may be recognized by its characteristic shape, though it is often so misplaced that the hilum is turned upward. The kidney is usually felt between the umbilicus and the false ribs, and may be pushed upward and downward, or laterally to a varying extent, or into the lumbar region to the normal

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[1] *Dublin Quarterly Journal*, February, 1867.

position of the kidney. When the kidney is pushed away from this position, the sound on percussion becomes tympanitic.

8. Just as renal tumors are usually associated with some evidence or history of hæmaturia, calculus, albuminuria, nephritic colic, or some noticeable change in the quantity or state of the urine, so ovarian tumors are usually associated with some change in the quantity and regularity of the discharge, or with the suffering at the catamenial periods, and with some alteration in the mobility or situation of the uterus. But, as, in some cases of renal disease, the urine may be normal, so in some cases of ovarian disease there may be nothing abnormal to be discovered in any of the pelvic viscera, or in their functions.

By bearing these facts in mind, an accurate diagnosis may be made in a very large proportion of cases. Some rare cases of exceptional difficulty may, however, be occasionally expected. Not as an excuse to the careless and ignorant, but as some solace to others who have erred unwittingly, and as an answer to some who, having little experience of the difficulties of actual practice, are apt to speak of all mistakes as inexcusable, I quote the following remark of one of the greatest clinical teachers of any age or country—Bright: "I have known the enlarged kidney to be mistaken for disease of the spleen—of the ovary—of the uterus—and for a tumor developed in the concave part of the liver; *nor is it perhaps possible, by the greatest care and the most precise knowledge*, altogether to avoid such errors.[1]

Differential Diagnosis of Renal Cyst and Ovarian Monocyst.

RENAL CYST—THIRD STAGE.	OVARIAN CYST—THIRD STAGE.
Commences above, and extends down toward pelvis.	Commences in pelvis.
Very rare, and very slow growth.	Common, and rapid growth.
History shows previous renal affection.	No such history.
No characteristic expression of features.	Characteristic expression.
Unilateral and fixed from the first.	Unilateral and movable at first.
No early emaciation; early œdema of lower extremities.	Early emaciation; œdema late, if at all.
Not exactly symmetrical at any time.	Symmetrical in advanced stages.
Intestine lies in front of tumor; gas heard or felt passing through it.	Intestine behind the tumor.
No catamenial derangement.	Amenorrhœa.

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[1] A diseased left floating kidney was mistaken by Dr. Hall Davis and Mr. Lawson for an ovarian tumor. The latter ascertained the real nature of the case by an exploratory incision; death on third day. Tumor four and a half by three and a half inches in diameter, and twelve inches long. Descending colon and sigmoid flexure, *behind* the tumor.—(*Edinburgh Medical Journal*, April, 1865, from *The Lancet.*)

Per vaginam—tumor may not be reached.	Tumor is almost always reached.
Fluid of cyst not albuminous; sometimes containing calculi.	Fluid highly albuminous; no calculi.
Urine usually contains pus, blood, or albumen.	Urine normal, but in diminished quantity.

5. **Hepatic Cyst.**—Since an hepatic cyst rises in the hypochondrium and extends downward, its history, if dated from the commencement, will at once show that the tumor in question cannot be ovarian. Fehr remarks that the hepatic tumor may be traced upward to the liver, the patient lying on the back. This history failing, we may still remember that hepatic develop far more slowly than ovarian cysts; and are preceded and attended by signs of organic disease. Large hepatic cysts are very frequently hydatid cysts; and a microscopic examination of the fluid, obtained by the exploring syringe I have recommended (p. 116), will usually detect the proofs of the parasite. Prof. J. P. White, of Buffalo, informs me that he removed such a cyst, weighing forty-three pounds, supposing it, at first, to be ovarian. The patient survived the operation but a few hours.

6. **Pelvic Abscess.**—Pelvic abscess, during its first stage, i. e., before suppuration has occurred, has been mistaken for a solid ovarian tumor, as it has afterward for an ovarian cystoma. But it is ushered in by swelling, hardness, tenderness on pressure—in a word, by a local inflammation, and by chilliness in connection with the suppuration. The enlargement is rapidly developed.

In ordinary circumstances, the distinction is therefore sufficiently clear between a pelvic abscess and an ovarian solid tumor, or cyst. If, however, there be inflammation and suppuration of the cyst-wall, more discrimination will be required—it being understood that the existence of the cyst had not been previously ascertained. A suppurating ovarian cyst or Fallopian tube is, however, more liable to be taken for a pelvic abscess than the latter for the former. Laumonier, indeed, in 1776, mistook for a pelvic abscess an inflammation and suppuration of the Fallopian tube, upon which the ovary, as large as an egg, rested, and incised the tube accordingly. He then, without any necessity, removed the ovary; and this has, by some writers, as will be seen farther on, been recognized as the first operation of ovariotomy ever performed.

Suppuration in an ovarian cyst is most frequent in young persons; and is indicated by a low, continued fever, by chills, a feeling of lassitude and of general debility, loss of appetite, and sometimes by vomiting and diarrhœa. These last two symptoms, however, do not generally occur unless septicæmia sets in. There is, indeed, hectic fever, with pain and tenderness on pressure in the cyst, and gradual loss of flesh. But, in this case, the patient has noticed the enlargement before the tenderness and pain occurred; while in the case of pelvic abscess they have no such precursor.

7. **Splenic Cysts.**—These are also preceded by impaired general health, and are very rare and of slow development. They, of course, commence in the left hypochondrium, and extend down toward the pelvis, and the history precludes the idea of ovarian tumor. The latter is, however, sometimes mistaken for a tumor of the spleen.

A young lady, aged twenty years, called on me a few years since, with an abdominal tumor, which, after examination, I unhesitatingly pronounced an ovarian cyst in the middle of the third stage, and advised ovariotomy at the most convenient time within one or two months. I was then told that a distinguished physician in an Eastern city had pronounced the tumor a cyst of the spleen, and had told the mother of the young lady not to allow anybody to talk to her about removing the tumor, as such an attempt would, of course, kill her daughter. He based his diagnosis mainly, I was assured, on the fact that the patient had an attack of intermittent fever when nine or ten years old. I then referred the mother to Dr. W. L. Atlee, who confirmed my opinion and advice, and thus, like myself, incurred the derision of the first-mentioned physician. A delay now ensued of some months, during which time several other physicians, who gave various opinions, were consulted. At length, after an examination by a surgeon, a peritonitis supervened, which for several weeks so jeopardized the patient's life that no operation was thought of; till at last, as a forlorn hope, Dr. Atlee was induced to remove the cyst. This was done with his usual dexterity; it being a case uncomplicated, except by the peritonitis and its results. But too much time had been lost, and the patient did not rally from the operation. Had the physician who made the original blunder been less obstinate in his own ignorance, and not felt it his duty also to prejudice the mother against any opinion which might differ from his own, the result might have been different. I do not think I have seen a more promising case than this was at the time of Dr. Atlee's and my own first examination.

I have received from Dr. E. P. Bennett, of Danbury, Connecticut, the report of a case in which a "floating spleen" was mistaken for an ovarian fibroma. The tumor had existed seven or eight years subsequently to a fall on the edge of a stair; did not affect the general health, but was the seat of a dull, painful sensation.

On opening the abdominal cavity Dr. Bennett found "the spleen, about twice the natural size, lying in the left iliac region, and attached to the stomach and intestines by long bands of areolar tissue." It was turned out of the abdominal cavity, and laid upon the surface of the abdomen for two or three minutes, was then returned, and the incision closed. Slight symptoms of inflammation ensued, but soon subsided. But the tumor gradually diminished, and finally ceased to give the patient any trouble. She was about thirty years old.

Cysts of the mesentery and the omentum (not the serous cysts before mentioned, p. 154) are also very rarely met with; but these commence at points too high for an ovarian cyst, and are all preceded by ill health. Thus they are far more liable to be mistaken for an hepatic, than for an ovarian cyst.

Mr. T. Bryant reports a case of tumor of the abdomen, at first thought to be ovarian, but afterward suspected of being hydatid. An incision two inches long was made into the cyst, and its hydatid contents discharged. The patient recovered.[1]

Having decided, from our investigation thus far, that neither of the preceding pathological conditions exists in the case under consideration, we may rationally conclude that we actually have a case of ovarian cyst; and, if the diagnosis of the three stages of such cysts, as given on page 120, be found also to apply to the case, we have attained to as high a degree of certainty, perhaps,

[1] Guy's Hospital Reports, vol. xiv.

as the present state of science admits. And, lastly, it is necessary to decide, so far as may be:

Question IX.—*Which of the three kinds of ovarian cyst is the one under investigation?*

I here also omit the solid tumor of the ovary, and refer to page 127 for its diagnosis.

The characteristics of the oligocyst (and monocyst), the polycyst, and the dermoid cyst, have been specified in Chap. II., Sec. II., and I have only to reproduce them here in a more concise form. I shall confine my observation also to the third stage, since it is not of such practical importance to make these distinctions with the greatest possible accuracy in the second stage. For a surgical operation is seldom to be thought of during the second stage, as has before been stated. The following synopsis must therefore answer our present purpose; and it will also be found to hold good for the second stage, except in a few points easily modified by the reader:

Differential Diagnosis of the Three Varieties of Ovarian Cyst—Third Stage.

MONOCYST AND OLIGOCYST.	POLYCYST.	DERMOID CYST.
Slower growth. Not uncommon.	Rapid growth. More common.	Congenital. Very slow. Very rare.
Peculiar expression comes later.	Comes much earlier.	Latest of all.
General health fails much later.	Fails early; by end of second stage.	Very late.
Abdomen symmetrical; if monocyst salient, pointed.	Not symmetrical; not pointed.	Not symmetrical.
Enlargement from 35 to 45 inches.	Sometimes to 55 or even 78 inches.	Smallest; generally 30 to 40 inches.
Surface smooth if monocyst.	Lobulated; irregular.	A monocyst, as a rule.
Tumor disappears after tapping.	Does not disappear.	Does not completely collapse.
Œdema of lower extremities very rare; abdominal veins less enlarged and later.	Very common. Veins enlarged early.	Very uncommon.
Adhesions less common and less firm.	Adhesions the rule, and vascular.	Adhesions not very rare.

Inflammation of cyst-wall not common.	Not so common.	Most common, proportionally.
Ulceration of cyst-wall not common.	More common.	Most common of all.
Spontaneous rupture not common.	Far more common.	Very uncommon.
Amenorrhœa comes later.	Comes much earlier.	Very late.
Fluctuation distinct, and throughout if a monocyst; and from any point to all others.	Less distinct, and circumscribed.	Fluctuation more obscure.
Per vaginam, uterus is higher, and the fluctuation also.	Uterus lower, and the fluctuation also, or none at all.	Uterus lower; fluctuation dull.
Pedicle longer, as a rule.	Shorter as a rule.	No rule.
Fluid limpid, amber, bluish, or greenish, viscid, with much albumen.	Not clear, brownish, dense, gelatinous, or albuminous.	Light color, curdy, no albumen, partly soluble in ether.
Contains epithelial scales, cholesterine, and fatty granules, and the ovarian glomeruli.	Contains also blood-pigment and blood-corpuscles.	Contains epithelial scales, sebaceous matter, crystals of cholesterine, hairs, etc., etc.; a single hair is pathognomonic.
Exception.—An oligocyst of but two or three constituent cysts, with thin partitions, may give all the signs of a monocyst.		

CHAPTER VII.

DIAGNOSIS OF ADHESIONS, LENGTH OF PEDICLE, ETC.; CARCINOMA OVARII; AND TAPPING AS AN AID IN DIAGNOSIS.

Having decided as accurately as possible which of the three forms of ovarian cyst we have to deal with, we have next to inquire whether there be adhesions; whether the pedicle is favorable for the operation of extirpation, if deemed advisable; which one of the ovaries is affected; and as to the quality of the fluid which the cyst contains.

SECTION I.

DIAGNOSIS OF ADHESIONS.

Adhesions are mainly due to inflammation of the cyst-wall. Hence any preëxisting signs of such inflammation afford a presumption of their existence. But they may occur independently of this process, and generally exist to some extent in every case of large ovarian cystoma. Dr. Keith found that the worst adhesions he encountered, occurred in connection with pregnancy. I here also speak of tumors in the third stage.

It is always impossible to detect, without laying open the abdominal cavity, any adhesion not upon the anterior and lateral surface of the tumor, except, perhaps, in a few cases in the first and second stage. We can, therefore, never be certain of the non-existence of adhesions in any case. But adhesions probably do not exist, at least, none of any importance, on the anterior and lateral aspect of the cyst, in the following conditions:

1. If the tumor bulges between the recti muscles when the patient rises suddenly from the dorsal decubitus, without using the hands. Dr. F. Bird attached much importance to this sign.

2. If the tumor falls an inch or more during a full inspiration; or if the muscles are seen gliding over it.
3. If it can be moved freely up and down.
4. If the abdominal wall can be gathered up over the tumor, and made to glide from side to side; or the tumor be moved freely from side to side.
5. If the cyst falls down in a mass toward the pelvis after tapping, or forms evident folds.
6. If ascites coexists with the tumor.
7. Oligocysts and monocysts are less liable to adhesions. But a large monocyst is probably adherent to the omentum at least.
8. If the growth is very rapid, and the tumor is not a polycyst.
9. If the tumor is a dermoid cyst.
10. If no signs of inflammation have been observed.
11. Adhesions are rare in patients with thick abdominal walls (Boinet, p. 367).
12. If, on making a small exploratory incision, the tumor is seen to move up and down with the diaphragm, there are no adhesions (Dr. F. Bird).

EXCEPTIONS.—There may be pelvic adhesions, though the tumor be movable to and fro above, as in Dieffenbach's case, to be again alluded to. And adhesions may coexist with ascites, as in Dr. Atlee's 211th case.[1]

The existence of adhesions is inferred from the following conditions:

1. If the tumor does not bulge between the recti muscles, when the patient rises quickly, as specified under the first condition on the preceding page. With Boinet, I do not attach any importance to this negative sign.
2. If the relations of the upper extremity of the tumor are not changed by a deep inspiration.
3. If it be absolutely immovable.
4. If the abdominal walls cannot be moved independently of it.
5. If its position be not changed by tapping. Sometimes, after tapping, the adhesions may be felt.

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[1] *American Journal of Medical Sciences*, October, 1870, p. 431.

6. If the tumor be a polycyst, and ascites do not coexist.
7. If signs of inflammation have existed.
8. If the fluid obtained by the first tapping is brownish, or of a darker color.
9. If the lower extremity of the tumor remains low in the pelvis; and especially if the uterus is at the same time elevated.
10. If pregnancy has occurred since the commencement of the cyst, or now exists (Dr. Keith).
11. If the uterus is in front of the cyst, and the latter has attained to the third stage. Even if the cyst is not felt, *per vaginam*, in the pelvis, pelvic adhesions probably exist of unusual length.

A feeling (first noted by Dr. Bright) of crepitation, or friction, while one attempts to slide the abdominal parietes over an ovarian tumor, has been held to indicate adhesion in the form of short and slender bands at that point. It is, however, a sign to be very cautiously interpreted. I have seen such adhesions in connection with it; but sometimes, as in a case recently seen by me in consultation with Dr. Emmet at the Woman's Hospital, it was due simply to a roughness of the external surface of the tumor. Generally it shows that the walls of the abdomen may move upon the tumor at that point, and therefore indicates that there are *no* adhesions. The roughness suggests a previous peritonitis.

It is also very generally assumed, as an objection to paracentesis, that we are to expect adhesions at the site of a previous tapping. This assumption will not, however, in the case of monocysts, bear examination. If we were to imagine the most unfavorable condition of all for adhesion to occur between such a tumor and the abdominal wall, or, rather, that in which adhesion would be impossible, it would be precisely that which is produced at once by tapping. If the two surfaces interested were not previously adherent, but only in contact, they are at once entirely separated, and are not again brought into contact for weeks or months, till the cyst refills, and the inflammation, if any has occurred at the site of the puncture, has entirely subsided. Besides, all ovariotomists of much experience have removed ovarian cysts which had been repeatedly tapped, and found that no adhesions existed. This was the fact with one of Dr. F. Bird's cases, the patient having been ten times tapped.[1] If, therefore, we find adhesions at the site of a previous tapping, we are to infer that they existed before the tapping, or occurred subsequently, but independently of it. They also occur at the same point in cases not tapped.

If it be objected that, in case of polycysts, no such separation of the surfaces interested, as I have supposed, may occur after tapping, I remark that, if it be so, the cause must be either that the surfaces are already adherent, or that the cyst is not materially diminished by the tapping. The first of these conditions certainly does not tell against my position; while, on the other hand, a polycyst should never be tapped, as a palliative measure, unless we feel assured that its size may thus be notably reduced. It will be seen that inflammation of a dangerous form is very often produced by tapping in case of a polycyst; and this is the reason why it should not be practised, and not because adhesions may ultimately result.[2]

But no adhesions are to be regarded as a bar to ovariotomy, provided they can be overcome and detached without injury to the adhering organ.

It may be added that serous cysts of the broad ligament are not adherent, while uterine fibro-cysts frequently are; and sometimes by fine, columnar bands, resembling the chordæ tendineæ of the ventricles of the heart. A serous cyst was treated by I. B. Brown by tapping and subsequent pressure, with an apparent recovery for three and a half years. It then began to enlarge again, and was removed by gastrotomy. But no adhesions had been produced by the tapping and the pressure combined.[3] It had a broad pedicle.

SECTION II.

DIAGNOSIS OF THE LENGTH OF THE PEDICLE.

It has been shown that no ovarian tumor has a pedicle at first, but that it is acquired as the tumor grows larger. The same is also true of serous cysts of the broad ligament, and most frequently they do not become pediculated at all. Nor can the uterine fibro-cystoma become pediculated unless it be of the subperitoneal variety.

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[1] *Medical Times*, November 4, 1843.

[2] See section on tapping as a palliative measure.

[3] *The Lancet*, 1865, p. 260.

It is impossible to ascertain the length of the pedicle of an ovarian cyst with precision; but certain conditions may be noted which afford strong grounds of probability. I have, however, in a few instances been able, immediately after tapping a large monocyst, distinctly to feel the pedicle through the attenuated and collapsed abdominal walls, while the uterus was brought forward and held firmly by the uterine sound. It is a matter of great practical importance to ascertain approximately the length of the pedicle, since upon it may depend the success of ovariotomy in the case. M. Tixier, of Strasbourg, has published a paper[1] upon "The Pedicle and its Treatment after Ovariotomy," from which I make the following extract:

> We have hitherto been able to diagnosticate, with almost perfect certainty, three varieties: the long, the short, and the twisted pedicle.
>
> 1. *The Long Pedicle.*—The abdomen has a peculiar aspect, the form "en besac." The hypogastric region of the abdominal wall is applied to the internal surface of the thighs, and the ovarian tumor, forcibly projected forward, seems to be removed from the superior entrance of the pelvis. A vaginal examination reveals an elevation of the cervix uteri, and the index-finger passed into the pelvic excavation does not meet with the tumor at any point. The uterus is more movable, and can be readily displaced. These symptoms, collectively, induce the presumption that there is an elongated condition of the broad ligament and the Fallopian tube; a condition favorable for carrying the pedicle through the abdominal incision.
>
> EXCEPTION.—Sometimes the cyst is adherent to the uterus, and is therefore carried up with the uterus, the pedicle still being short. This condition obtained in one of Kœberlé's and one of my own cases of ovariotomy.
>
> 2. *The Short Pedicle.*—The existence of the short pedicle may be assumed in the presence of the following symptoms: in the first place, the form of the abdomen differs from that described above; a lateral extension is observed, without pronounced prominence of the median portion. In attempting to introduce the tip of the finger between the tumor and the pubes, the surgeon feels through the skin that the growth passes into the pelvic excavation; its base seems to be seated over the pelvic opening. The vaginal touch denotes a sinking of the cervix uteri, and a more or less

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[1] *Archives Gén. de Méd.*, Juillet, 1870; and Ranking's "Abstract," January, 1871.

pronounced immobility of the uterus. If the pelvic excavation be then explored with the finger, it is found not to be free, and that certain parts of the tumor are contained within it. In the presence of these facts, the surgeon may assume that there is a greater or less degree of shortening of the pedicle.

3. *The Twisted Pedicle.*—At first sight this torsion seems difficult to determine. It may, however, under certain conditions, be diagnosticated with greater certainty than the two preceding varieties. Its existence may be concluded whenever the following symptoms have been observed:

The patient experiences at intervals very acute pains, radiating downward to the vein (?) corresponding to the affected ovary, and upward to the lumbar region on the same side. These pains are excited by labor and fatigue. They come on also when the patient is in bed, and when she wishes to change her position. The patients also complain of very strong uterine cramps analogous to those occasioned by deligation of the pedicle. The cystic fluid is more or less deep in color, presenting an hæmorrhagic appearance. The touch in these cases gives no precise indication. One can only acquire the idea of the existence of an habitually long and thin pedicle in cases of this kind.

All the cases thus far reported of twisted pedicle, except one (p. 80), have been solid tumors of the ovary. This accident is, therefore, a very rare one.

SECTION III.

DETERMINATION OF THE OVARY AFFECTED BY CYSTIC DEGENERATION, AND OF THE QUALITY OF ITS FLUID.

1. **Determination of the Ovary affected.**—It is impossible to ascertain with certainty, after the cyst has passed the middle of the second stage, which of the two ovaries is affected, except in a very few instances; and only, so far as I am aware, by the manipulation immediately after tapping (and in the case of a monocyst), which I have described under the preceding head, for ascertaining the length of the pedicle. Of course, the same examination will show from which side of the uterus the pedicle rises, and thus which ovary is affected by the disease. I have thus been able to answer this question, in case of a few large monocysts; for, the more the abdominal walls have been distended and thinned before the tapping, the more easy to ascertain the fact in this respect.

So far, however, as the operation of ovariotomy is concerned, this question is of no practical importance, until the pedicle is actually reached in the progress of the operation. But, in case of treatment by iodine injections, it is a matter of great moment to decide beforehand from which side the cyst originated. And this can be determined very conclusively in the first stage, and generally also during at least the first half of the second stage.

During the first stage the vaginal touch detects the cyst lying mostly on the side of the pelvis, whence it originated, whether it be an oligocyst or a polycyst. Boinet states that the sound now shows also that the body of the uterus is drawn toward the affected side, since the diseased ovary drags it in that direction, and thus causes the cervix to be turned toward the unaffected side. I am positive I have found the reverse of this to obtain in most instances, viz.: that the body of the uterus leans toward the unaffected side, while the cervix is drawn to the affected side.

In the second stage, if the cyst rises freely out of the pelvis, the patient will be able to say on which side she first perceived the enlargement; and for a time, till the third stage is approached, the sound and the vaginal touch may decide, even if a portion of the lower extremity of the cyst still remains low in the pelvis.

We cannot at all rely on the rational signs in deciding which ovary is affected. In Dr. Atlee's first case of ovariotomy the left ovary was affected, though all the symptoms pointed to the right.[1]

2. **Determination of the Quality of the Fluid.**—This is also a subject equally unimportant to the ovariotomist, with the preceding, except so far as it sheds light upon the diagnosis; and the method of obtaining a sufficient amount of fluid for that purpose has already been explained.

If, however, the question of treatment of the cyst by iodine injection be under consideration, the determination, in advance, of the character of the contained fluid, is of paramount importance; since no one would propose this treatment except for monocysts with clear serous, or sanguineous, or purulent contents. Boinet, therefore, gives the signs of these particular forms of fluid,[2] which I here repeat; it being supposed that the diagnosis of ovarian cyst is already made:

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[1] *American Journal of Medical Sciences*, July, 1844, p. 60.

[2] Pages 138, 139.

1. If the fluid is clear serous, or sero-sanguineous, the fluctuation is neat and distinct, almost as in ascites.[1]
2. If purulent, fluctuation is less distinct, and there have been tenderness of the cyst, fever, and loss of appetite, indicating inflammation.
3. If the fluid is dense, thready, gelatinous, fluctuation is dull and indistinct, as felt usually in polycysts.

EXCEPTION.—A monocyst is, very rarely, found filled with a gelatinous fluid so dense that it will not flow at all through a canula of the largest size, but which gives a fine tremor on percussion, which even an expert might mistake for the fluctuation of ascites, or a serous fluid in a monocyst. I have had the care of a single case of this kind, and have seen another in consultation with Dr. Thomas. In neither instance was the nature of the case suspected till the trocar was thrust into the cyst. At the operation of ovariotomy, the colloid contents were scooped out by the hand in both instances. Boinet also relates a similar case.

SECTION IV.

THE DIAGNOSIS OF OVARIAN CYSTS AS AIDED BY TAPPING.

Paracentesis abdominis may be resorted to in connection with ovarian cysts, with three entirely distinct intentions:

1. As an aid to diagnosis.
2. As palliative treatment.
3. With a curative intention, when followed by other treatment.

The two last-mentioned applications of this operation will be discussed in a future section.

It is remarked by Nussbaum that tapping is too dangerous a procedure to be resorted to for diagnostic purposes; while Boinet advises it in all cases, to make the diagnosis certain, as having nothing "grave" in it. But we must discriminate. Tapping for the removal of an ascites is never to be regarded as a dangerous operation, though, in very rare instances, serious consequences have ensued, and generally from hæmorrhage. Tapping an ovarian monocyst is not a dangerous operation, but attended by more risk, in ways which will be explained farther on, than the preceding operation. But tapping a polycyst *is a very dangerous* operation, and which should never be performed *except for diagnostic purposes.* This last statement of course requires explanation.

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[1] Kœberlé states that if the fluid is not clear, and the patient is emaciated, it is found, on placing the latter in a dark place, and throwing a light in the direction of the linea alba, that it does not show a transparency of the abdomen.—" Opérations d'Ovariotomie," p. 3, note.

1. It may aid the diagnosis in a case of ascites with suspected ovarian tumor, and with perhaps also a uterine fibroid, to remove the ascitic fluid by paracentesis, when the diagnosis is easily made, and without danger. Or the same may be done in case of large ascitic accumulation with a small ovarian tumor supposed to be carcinomatous, in order if possible to settle the question of malignancy. Pregnancy with ascites may be mistaken for ovarian tumor till the trocar unmasks the fœtal sounds and movements by removing the fluid which concealed them. In some cases it is very difficult to distinguish between ascites and even ovarian monocyst, even after all that has been said in the sections on diagnosis, until the trocar decides that the supposed ascites is or is not so.

In all these cases we purposely perform paracentesis for a supposed ascites. There is no danger from admitting a small amount of air into the peritoneal cavity, and expelling it again; none from the contact of the fluid with the peritonæum, for it has previously been in such contact. The only risk is from hæmorrhage from puncturing a vessel in the abdominal walls—a very uncommon accident.

If, therefore, a tumor remains after the supposed ascitic fluid is withdrawn, it may be an ovarian cyst, pregnancy, a uterine tumor, or an hepatic, splenic, or renal cyst. And, if an ovarian cyst had really been tapped instead of the peritoneal cavity, the other may prove to be a second ovarian tumor. The principles of diagnosis already given must decide; it being remembered that a case of ascites, though many times tapped, has still been mistaken for ovarian cyst (p. 133).

2. It may be advisable to tap a monocyst, to determine the existence or non-existence of extensive adhesions, or whether it be a dermoid cyst, if the small exploring syringe should not settle this question. And in some cases this may be the only method of completing the differential diagnosis of ovarian cyst and uterine fibro-cyst. Again, it may decide the question

between the serous cyst of the broad ligament and the ovarian monocyst, and, at the same time, produce a permanent cure of the former, should it not, as is most probable, refill.

Here, however, three additional dangers are superadded to the operation: viz., from hæmorrhage from a vessel punctured in the cyst; from inflammation supervening in the cyst; and from peritonitis in consequence of the escape of the fluid from the cyst into the peritoneal cavity. The first accident, however, is very rare, since the wall of a monocyst at the point of tapping is seldom very vascular. Inflammation of a monocyst, from tapping, is also rare for the same reason. And, so long as the fluid of a monocyst remains clear and serous, though highly albuminous, it has no decidedly irritating effect upon the peritonæum. If, however, it has become purulent, or, from any other quality, irritating to the peritonæum, peritonitis will be the almost certain result of its admission into the peritoneal cavity. This accident may, however, be prevented almost certainly, by adopting the precautions which will be specified in the section on tapping as a palliative measure.

Tapping a monocyst, therefore, under the most favorable circumstances, is not a decidedly dangerous operation, though it is by no means unattended by risk. I once lost a patient within forty-eight hours after tapping a monocyst, apparently from mere shock. The cyst was filled with a colloid substance so dense that it would not flow through the largest-sized canula, and but very little was obtained by the operation.

3. But tapping a polycyst is always a dangerous operation, since it includes the three risks of the preceding one, and each one of them in a highly-exaggerated degree. For, the cyst-wall being far more vascular, both hæmorrhage from the puncture, and inflammation, are far more liable to ensue. Indeed, the latter often occurs, as has been seen, in polycysts, when no exciting cause can be assigned. And the fluid of a polycyst is generally of such an irritating character as very constantly to produce peritonitis if it come in contact with the peritonæum. Hence the spontaneous rupture of a polycyst is almost always fatal, unless the ovariotomist comes promptly to the patient's rescue.

None but a very imperative reason should therefore induce the surgeon to tap a polycyst; and I think it should never be done at all, unless he is prepared promptly to remove the cyst by ovariotomy, if the explorative tapping demonstrates that he actually has a polycyst to deal with.

In case, then, we have to settle the question between a renal or perhaps an hepatic cyst on the one hand, and an ovarian polycyst on the other, and the differential diagnosis, after resorting to all other means, is still obscure, it is justifiable, dangerous as is the operation in case it prove to be the latter, to tap the cyst—the understanding being that, if it prove to be a polycyst, it shall be without delay removed. And in such circumstances alone should a polycyst be tapped.

SECTION V.

EXPLORATORY INCISION AND PUNCTURE IN AID OF DIAGNOSIS.

We have here to distinguish between exploratory incisions and cases of unfinished ovariotomy. In the latter, the operator proceeds, after he has made the incision, on the presumption that he will remove the tumor, until he feels compelled by some obstacle to desist. He has, therefore, done something more than the making of the incision, and the patient is thus left in a condition which in a large minority of the cases proves fatal. In the appendices to his third and fourth one hundred cases of ovariotomy, Mr. Wells reports thirteen cases unfinished, of which five recovered, seven died, and the remaining one also died a few weeks after. I. B. Brown reports eight cases, of which seven died. Dr. Keith had but one case (his sixtieth), the patient being in good health two years afterward. Of Mr. Phillips's collection of fifteen cases of unfinished ovariotomy, nine recovered. Of the sixty cases recorded by Dr. R. Lee, forty-one recovered and nineteen died. Dr. Churchill's table included ten cases of unfinished ovariotomy, of which five recovered and five died.[1]

The less there is done in addition to making the incision, the better the chance for recovery:

1. An exploratory incision, on the other hand, is cautiously made in a doubtful case, and with the express understanding

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[1] London *Medical Gazette*, May, 1846, p. 916.

that the tumor may be other than an ovarian cyst, and that the incision shall be closed without further proceeding, in case it settles the diagnosis adversely to the supposition upon which it was made. Mr. Walne first practised it in November, 1842. He remarks: "I introduced the tentative incision in my first operation, which I have since uniformly resorted to, and of which other operators have, by adopting it, shown their appreciation. . . . In making use of it, the eye and the finger are both serviceable." He made it one and a half inch long, or more.[1] It proves not to be a dangerous procedure, in most of the cases in which it is justifiable. Kœberlé states that three-fourths of the cases recover from it, though he thinks exploratory incisions have been abused, by some American and English surgeons.

When, therefore, all the preceding methods fail to establish the diagnosis, it may be justifiable to make an incision through the abdominal walls, one inch (or two if required) in length, for that purpose.

Cases of attempted ovariotomy, in which no tumor at all is found, generally recover promptly, since no further violence is done after the incision shows that there is no call for further interference. Of five cases of this kind reported by Mr. Phillips, all recovered. Death, however, not very seldom results, as might be expected. Of eight such cases collected by Dr. Churchill, four recovered, and four died.

Still less dangerous, however, is the making a short incision (one to one and a half inch), as I have already specified, for the express purpose of introducing the finger, or the steel sound, to ascertain the character of the tumor, and the presence or absence of adhesions—provided, always, that the patient's general health is not too much depressed. Of Dr. W. L. Atlee's two hundred and twenty-two collected cases, twenty-five were cases in which explorative incisions merely were made, and all these recovered.[2] Dr. F. Bird stated before the Medico-Chirurgical Society, November 12, 1850, that he had made such incisions in between forty and fifty cases without any injurious consequences ensuing. For, if he found adhesions, he at once closed the incision without exposing the viscera at all; while, if he found none, he removed the tumor.

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[1] London *Medical Gazette*, February 23, 1844.

[2] Transactions American Medical Association, 1851.

If, however, the general health is very much prostrated, the danger is too great; and the incision should not be made at all, except with the understanding that, if the presence of an ovarian tumor is demonstrated by it, the operation of ovariotomy be at once performed. I have seen death follow such incisions carefully made, within twenty-four to seventy-two hours afterward, in six instances of great general prostration. The mere shock apparently proved fatal. Mr. Wells had fourteen cases, of which four died; and I. B. Brown also seven cases and three deaths. The latter thinks that exploratory incisions have been unfairly condemned by the profession.[1]

The following propositions may guide us in their use:

1. They should not be resorted to at all until surgical interference of some form is demanded.
2. They should not be used, if the patient is very much prostrated, except as the commencement of an intended ovariotomy.
3. They may be resorted to, as a final resource, if all other methods of diagnosis fail to determine the character of the tumor, if the two preceding rules are complied with, and there is reason to expect an easy removal of the cyst if found to be ovarian.

2. An exploratory puncture for a diagnostic purpose is sometimes resorted to, and especially for the removal of the ascitic fluid, in cases of ovarian cyst complicated with ascites. Mr. Wells makes the puncture with a lancet instead of a trocar, and then passes a silver tube, with a conical extremity, into the peritoneal cavity. The tube is about twelve inches long, and not only gives exit to the fluid, but also answers as a sound for the determination of the size and connections of the tumor, and the presence or absence of adhesions. The risk of this procedure is very slight, as it scarcely amounts to any thing more than tapping for ascites.

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[1] *The Lancet*, June, 1863, p. 468.

SECTION VI.

DIAGNOSIS OF CARCINOMA OF THE OVARY.

The opinion has already been expressed that, of all the diseases of the ovary, carcinoma is the least common; and that many, and even most, of the cases which have been mentioned as carcinoma were not really such. Nevertheless, carcinoma does very rarely occur; and it is a matter of the utmost practical importance seasonably to diagnosticate it, if possible, and thus prevent an uncalled-for resort to ovariotomy, on the supposition that the case was one of the forms of ovarian cystoma.[1] On the other hand, it is equally important not to mistake the latter for carcinoma, and thus deprive the patient of the only chance of recovery, by withholding the operation just mentioned. At the present time there is, I am quite sure, more danger of committing the latter than the former blunder, though it be far the more injurious of the two. The useless resort to ovariotomy in a case of carcinoma results in a closure of the incision on discovering the real nature of the case, and a possible but not very probable fatal result, in a case that must soon prove fatal at any rate. The other mistake dooms to death a patient who by the operation had the average chance to be saved.

In doubtful cases, it is therefore our duty to assume that carcinoma does not exist until we can be very certain it does exist, from symptoms which are to us convincing; or, if such signs are not present, to regard the case as not malignant, and proceed to the operation, till it is proved to be malignant by ocular inspection.

I. B. Brown has quoted Kiwisch as the best authority on this subject ten years ago.[2] Some criticisms have already been made upon some of his views; and, as he regarded both what he termed the areolar cyst and the cystosarcoma as carcinoma, we must accept his ideas with allowance at the present time (p. 21). Mr. Brown himself remarks that, "when an ovary is attacked by malignant disease, the increase of the tumor is more rapid, the pain attending it much greater, often lancinating, the constitution is usually much more grievously affected, the health and strength quickly destroyed, the functions of the stomach and nutrition seriously impaired, and the complexion sallow; in fine, the system is altogether cachectic. At the same time, enlargement of the abdominal glands, the evidence of cancer in other parts, the unevenness of the abdominal tumor, the thickness and density of its walls, and the indistinct or imperceptible fluctuation, afford further evidence of the dreadful disease with which we have to deal" (p. 51).

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[1] See an interesting paper on this subject by Prof. T. G. Thomas, in *The American Journal of Obstetrics*, May, 1870.

[2] Pages 25–27.

We agree with the author just quoted that "the concurrence of most or all of the above symptoms renders cancerous ovarian disease not difficult to diagnose." And yet all these symptoms would not prove that the case was originally one of carcinoma of the ovary, or indeed that it had extended to the ovary at all; it might affect some other part. It would, however, be enough to know that cancer existed anywhere in the abdomen; for that would contraindicate any treatment directed especially to the ovary.

In the preceding enumeration of symptoms, the most important one of all, though it is not pathognomonic, as herein explained (p. 97), has been omitted. I allude to a large ascitic accumulation rapidly formed while the tumor is still small, in the first stage even. But, if, together with this symptom, the lower extremities early become œdematous, the probability of carcinoma of the ovary is still increased. And constant fever, emaciation, and rapid decline of health, out of all proportion to the size of the tumor, a dry and yellow skin, and the cancerous cachexia as distinguished from the ovarian in the third stage, complete the diagnosis of carcinoma of the ovary.

Great pain in the cyst is not to be accepted as pointing at all to cancer, unless other decided signs coexist. The inguinal glands do not become enlarged, as stated by some writers,[1] nor does the recto-vaginal septum become indurated, so long as carcinoma is confined to the ovary; nor do these symptoms prove that the disease commenced in that organ. Its lymphatics are not continuous with the glands just mentioned. Nor is carcinomatous ovary necessarily painful. A lancinating pain referred to the ovary, which is found to be somewhat enlarged, and which returns principally at night, suggests the question, if the above symptoms coexist, of malignant disease.

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[1] T. S. Lee, p. 233.

I should not, however, omit to state the opinion of Kœberlé, that carcinoma of the ovary is quite a common affection, though, if it be removed by ovariotomy before any other organ is implicated, the patient, if she recovers from the operation, is usually restored again to permanent good health. Admitting the last proposition, I still maintain that a large proportion of the alleged cases of permanent health after the removal of carcinomatous ovaries are instances in which some other pathological condition had been mistaken for carcinoma.

Carcinoma, as we have seen, sometimes occurs in ovarian cysts as a secondary deposit, in which case its diagnosis is impossible till the cyst is removed. This fact is, however, of no practical importance, since the patient recovers from the operation and continues exempt from the return of the malignant deposit, the same as if it had not appeared in the cyst at all. It is far more common in case of polycysts. Boinet mentions a case of this kind (p. 179).

LEEDS SCHOOL OF MEDICINE

CHAPTER VIII.

PROGNOSIS OF OVARIAN TUMORS; EXAMINATION OF A SUPPOSED CASE.

SECTION I.

PROGNOSIS.

Before proceeding to the treatment of ovarian cysts, it is proper to inquire what will be the result if they be left entirely to Nature, and merely medical treatment; or, since I shall show that medical treatment is of no curative avail, what will be the result under any except surgical treatment.

In regard to the solid tumor of the ovary, I merely repeat here, that it seldom becomes large enough to interfere with the general health; but, if it does, or if its pedicle become twisted, ovariotomy is the only remedy.

Each of the three forms of ovarian cyst, if left to Nature and mere palliative treatment, destroys the patient; but not all with equal rapidity. The prognosis of the polycyst is most grave of all, of the dermoid cyst least so, while the oligocyst or monocyst manifests an intermediate gravity. The final result, however, is scarcely less certain in one case than in another; for, when a cyst has already advanced far into the third stage, the fatal termination will not be for many months, at longest, delayed. A very few exceptions have been met with in favor of monocysts and dermoid cysts, patients continuing for years to carry a large ovarian cyst. But even these exceptions, from the constant misery and suffering they entail, are scarcely to be preferred to an early death; and, in respect to polycysts, hardly an exception can be found. All the cases I have been able to find in medical literature, of patients whose lives have been prolonged for several years by palliative tappings, have already been mentioned (p. 64); and very small is their number.

According to the tables of Dr. Robert Lee and of T. S. Lee, ninety per cent. of all patients die within two years after first seeking medical aid for an ovarian cyst, unless cured by timely surgical interference. And I risk nothing in saying that, of one hundred women affected with ovarian cysts in the third stage, with general health already declining, at least ninety-five or ninety-six will be dead within the time above mentioned. Admitting that there were fifty-seven cases of polycyst, thirty-eight of oligocyst, three of true monocyst, and two of dermoid cyst—this being about the relative proportion, as to frequency, of the three kinds of cyst (the ovarian fibroid and carcinoma ovarii occurring less than once in one hundred cases, and therefore being here omitted)—we might find the result about as follows:

	Whole No.	Dead at end of one year.	Dead at end of two years.	Living at end of two years.
Polycysts	57	50	57	None.
Oligocysts and monocysts.	(3+38) 41	27	38	3
Dermoid cysts	2		1	1

It must also be added that a slowly-growing cyst, and which has existed for years, may suddenly develop rapidly, and promptly terminate as the rest. If the prognosis be confined to young women only, it will also be even graver than thus far represented.

In the preceding remarks I have had in mind only the ordinary progress and effects of ovarian cysts. But they may also indirectly, as well as directly, kill the patient. A *résumé* of the various ways in which they may cause death will show that the prognosis is even more grave than above expressed:

1. By pressure of the cyst upon the stomach and alimentary canal, the function of digestion is impaired, and finally destroyed, and the patient dies of inanition.

2. The diaphragm being fixed, and the ribs kept elevated by the pressure, respiration and aëration are interfered with, pulmonary congestion supervenes, and then the patient is destroyed by bronchitis or pneumonia. For—

3. Very slight intercurrent affections, of no importance to a woman in health, may suddenly prove fatal to one in whom scarcely a single function is normally performed. A slight exposure to cold may develop any thoracic or abdominal inflammation, and the patient has very little strength to withstand it; for the nervous and muscular systems are also prostrated by the exhaustion consequent upon both the pressure and the drain upon the blood by the exaggerated amount of secretion.

4. In rare instances, Bright's disease is produced by the causes just mentioned.

5. The patient may die suddenly from peritonitis, produced by the escape of the fluid into the peritoneal cavity, in consequence of a rupture, by a blow, or otherwise, of the cyst-wall. This is far more common with polycysts, both because their walls are thinner, and because their fluid is more irritating.

6. Inflammation of the cyst itself may occur, and kill the patient. Cruveilhier admits the frequency of this occurrence, as I also do, in case of polycysts and dermoid cysts.

7. Suppuration may occur in the cyst, and the pus be discharged into the peritoneal cavity with a fatal result.

8. A fatal hæmorrhage may spontaneously occur within an ovarian cyst.

9. Finally, should pregnancy occur with an ovarian cyst, the latter is very liable to undergo softening or inflammation of a very dangerous form, either during gestation, or immediately after parturition. Whether, however, the existence of an ovarian cyst in an unmarried woman should be accepted as a bar to matrimony, is a question to be decided after considering the propriety of ovariotomy in each special case.

A single cyst, or an oligocyst of large size, will not prove fatal so soon as a polycyst of the same size, since no new cyst will be formed in the former case, while in the latter there is no limit to cyst-formation.

Thus an ovarian polycyst, if not submitted to surgical treatment, is as certainly fatal as any malignant disease, and, after it has attained to a large size, as rapidly so. The dermoid cyst and the oligocyst are not less certainly fatal than the preceding, but only require a somewhat longer time to exhaust the vital force. The exceptions to this last statement are too few to be taken into account when we come to decide upon the treatment appropriate to ovarian cysts.

SECTION II.

EXAMINATION OF A CASE OF SUPPOSED OVARIAN TUMOR.

An examination of a case of supposed ovarian tumor must be made in the most methodical manner, to be of any value, for, otherwise, important points may be entirely overlooked. Each ovariotomist will therefore have blanks prepared to be filled up under the headings they contain.

Mr. Wells published his "Suggestions for taking Notes of Cases" in his first volume in 1864. He has since issued two editions of the same in pamphlet form, with such emendations as subsequent experience has suggested. One of these, extending over twenty-five pages, he uses for each case.[1] Its headings are as follows:

Number; date of first visit; name; age; residence; occupation; married, single, or widow; if married, when; children, number and ages; abortions; usual medical attendant.

I. **State at First Visit.**—General appearance; complexion; emaciation; habits of life; surface of body (temperature of skin and extremities, perspiration, glandular swellings, eruptions, ulcers, varicose veins, œdema); mammary areolæ.

Inspection of abdomen; measurements; diagram for outline of tumor (Fig. 36); palpation, percussion, and auscultation.

Mobility of tumor; evidence of adhesions; thickness of parietes; lineæ albicantes; dilated veins; fluctuation; impulse; crepitus; tenderness; sounds on percussion; sounds on auscultation; lumbar sounds on percussion; effects of pressure on other organs.

Examination of the Pelvis.—Uterus.—Situation; deviations; mobility; length of cavity; condition of os and cervix.

Vagina, Rectum, and Anus.—Diagram for outline of pelvic portion of tumor (Fig. 37).

The Menstrual Function.—When first established; still continued; when arrested; sudden suppression; excess or deficiency; leucorrhœal or other discharge.

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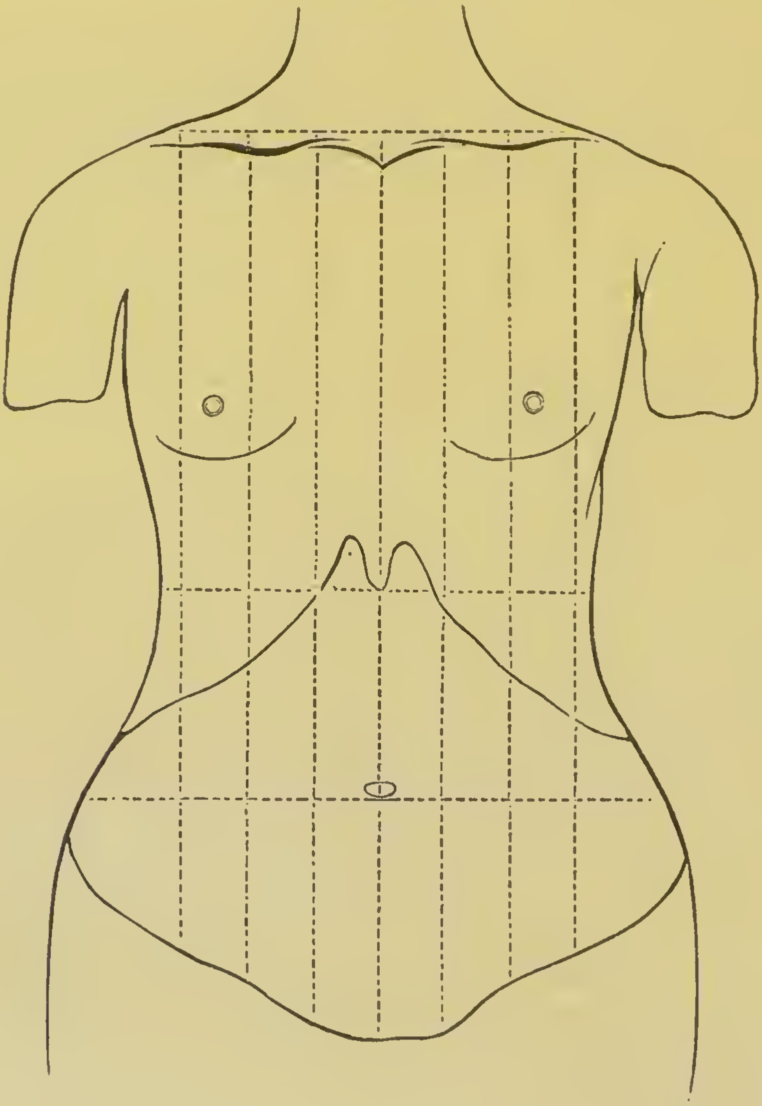
[1] It is adapted also to all the other kinds of abdominal tumors.

Urinary Organs.—Dysuria; incontinence; irritable bladder; urine (color and odor; specific gravity; reaction; quantity in twenty-four hours; albumen, sugar, pigments; deposits, inorganic, organic; blood, pus, epithelium, casts of tubes, confervoid vegetation).

FIG. 36.



Digestive Organs.—Tongue; appetite; thirst; flatulence; action of bowels.

Nervous System.—Sleep; mental condition; neuralgia; hysteria.

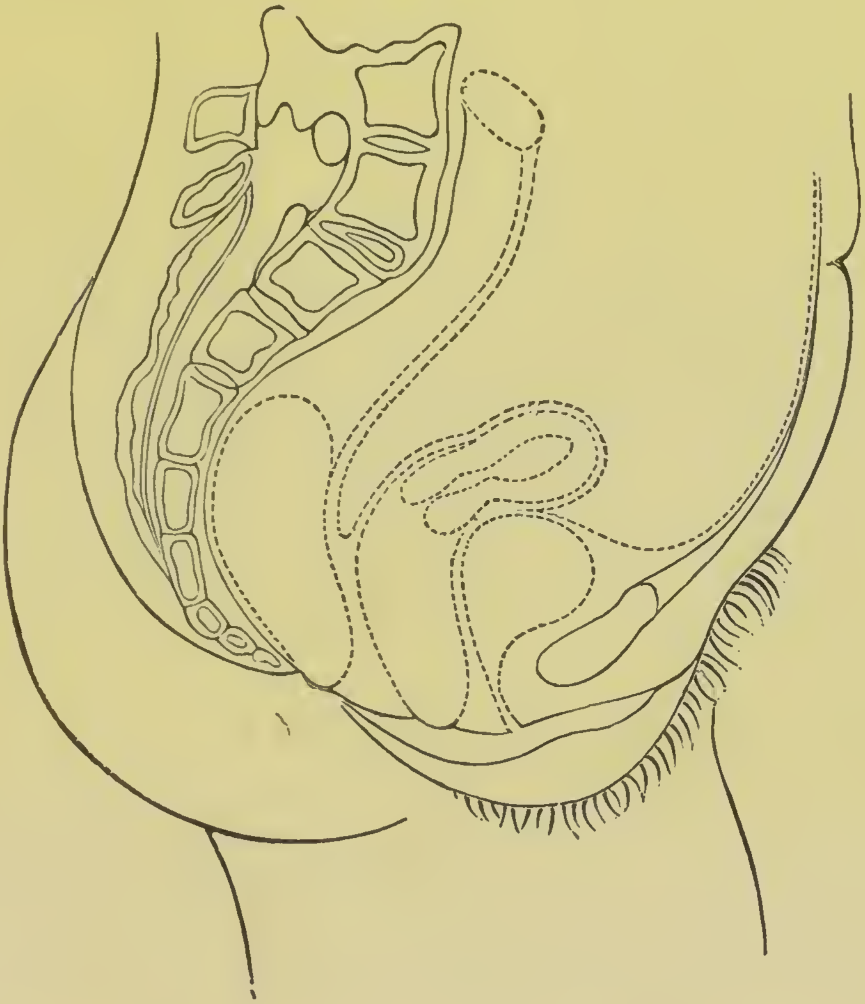
Respiratory Organs.—Breathing; cough; expectoration; physical signs; rests best on —— side.

Circulation.—Pulse; sounds of heart.

II. **History.**—Hereditary influence (parents, brothers, and sisters; other blood-relations); where born and formerly residing; climate, or local peculiarities (soil, sewage, water); mode of life; moral causes; previous diseases; accidents.

Early Symptoms.—First signs of ill health; pains or tenderness in (groin, or pubic region); vaginal fulness; bearing down of uterus; pressure on bladder; pain, numbness, or weakness of leg; constipation; fulness, or pain in breasts; nausea; symptoms worse periodically; increase in size; discovery of tumor; early treatment.

FIG. 37.



Progressive Symptoms.—Rate of enlargement; movements felt; changes in situation; aggravation of early symptoms; dyspnœa; tympanites; febrile attacks; cyst-inflammation; peritonitis; ascites; discharges through (uterus, vagina, bladder, bowel, abdominal wall); spontaneous rupture of cyst; treatment; date of any tappings, with nature and quantity of any fluid removed.

Prognosis.—Probable duration of life if left alone to palliative treatment.

General Treatment.—Medical and surgical treatment.

Progress. (Fig. 37.)

Result of treatment.

III. **Operation.**—Date; where performed; names of assistants and visitors; anæsthetic, ——, administered by ——; nurse's name; incision (situation; extent); adhesions; tapping of cyst or ——; removal of tumor; pedicle (size and length, relation to uterus, how secured); hæmorrhage; opposite ovary, state of; uterus.

Closure of wound.

Operative peculiarities.

Previous diagnosis compared with operation.

Description of Tumor.—Quantity of fluid removed; weight (of cyst, or of ——; of solid matter removed).

IV. **After-Treatment and Progress.**—Daily observations on the pulse, respiration, temperature, urine, perspiration, etc., may prove of great interest, when compared with meteorological observations taken for a few days before and after the operation, especially with regard to ozone and antozone.

(Several pages are divided and headed thus):

Date.	Hour.	Condition, remedies, etc.	Temperature.	Pulse.	Respiration.

In the above table the result of the operation and the subsequent history of the case are to be entered.

CHAPTER IX.

THE TREATMENT OF OVARIAN CYSTS, EXCEPTING OVARIOTOMY.

The treatment of ovarian cysts is naturally subdivided into the medical and the surgical.

SECTION I.

MEDICAL TREATMENT OF OVARIAN CYSTS.

Dr. William Hunter remarked, over a hundred years ago, that "he had occasion to see a great number of encysted dropsies, many of them treated by physicians of the first rank, and had never seen one cured; nor had he ever known one of that kind where the cyst had been sensibly diminished by any other means than by the trocar. If he might judge from what he had seen both in the living and the dead, he believed that the dropsy of the ovarium is an incurable disease." [1]

Physicians, however, continued their efforts to check, and if possible to cure ovarian dropsy by internal medication. And, as an index of the state of medical opinion in England on that subject, even forty years ago, I quote from the work of Dr. Seymour on the Diseases of the Ovaria: [2]

Digitalis, our author remarks, fails to cure, unless ascites coexists (p. 90). He strongly recommends emetics, though their action is not explained, and gives a case from the practice of Dr. Percival in proof of their efficacy. Nor would he discountenance bloodletting, nor the use of purgatives, especially in the first stage. He, however, trusts almost exclusively to medical treatment; for he is decidedly opposed to tapping; and says that ovariotomy is out of the question if there be adhesions. But ovariotomy had at this date been attempted but eighteen times in all; eleven times in the United States, and four times in England with one cure, and thrice in Germany also with a single success. He does not speak of a long-continued starvation as a remedy, which Kiwisch in one case found to produce a marked decrease of the cyst.

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[1] "Medical Observations and Inquiries," vol. ii., p. 41, 1762.

[2] "Illustrations of Diseases of the Ovaria," E. J. Seymour, M. D., F. R. C. P., London, 1830.

In 1840, Boinet published a case of recovery from ovarian dropsy under medical treatment by himself.[1] But, inasmuch as he distinctly asserts that the patient was cured, not by the medicines he administered, but by a considerable loss of blood,[2] we need not detail the particulars of the case.

I have already alluded (p. 71) to a case of complete collapse and atrophy of an ovarian cyst under my care in 1861, after the administration three times daily, for five months, of one half-ounce of a saturated solution of the chlorate of potassa. But, as I have prescribed it in many cases since without any such effect, I cannot suppose that the subsidence of the cyst was due to the medicine.

M. Boinet refers[3] to four cases of cure of ovarian cysts by internal medication, which were reported by Nauche, Helmann, and Craig, the last in the *Edinburgh Medical Journal* for November, 1865 (pp. 427–430). The two cures reported by Mr. Craig were effected by a saturated solution of the chlorate of potassa, a dessert-spoonful *ter die.* But the particulars are not stated with satisfactory definiteness; and the cases of Nauche and Helmann go back to a time when ascites and ovarian cysts were very often confounded.

In December, 1866, Prof. Courty, of Montpellier, published[4] two cases of cure of ovarian cysts by the use of the oxide of gold. It was given at first in doses of two to five milligrammes ($\frac{1}{33}$ to $\frac{1}{14}$ grain); and gradually increased to five centigrammes, ($\frac{3}{4}$ of a grain). There is, however, ground for doubt respecting two important points in these cases of M. Courty: 1. Whether they were cases of ovarian cysts; and 2. Whether, if they were really such, they were cured by the oxide of gold.

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[1] *Gazette Médicale*, 1840, p. 605.

[2] "Maladies des Ovaires," p. 224.

[3] Ibid., p. 221.

[4] *Montpellier Médicale.*

1. In the first case, there "appeared to be a large unilocular cyst with serous contents, complicated with a chloro-anæmic condition and infiltration of the lower extremities after a considerable lapse of time. She could neither go up-stairs nor walk quickly." It will be observed that these are the symptoms rather of ascites; or, if of an ovarian cyst, of a polycyst, and not of a monocyst. But no one expects to cure a polycyst by mere internal treatment, and the patient, therefore, was probably cured of an ascites. But, at any rate, she was cured in a month; far too short a time, it is believed, had the enlargement been due to an ovarian monocyst.

The second case was that of a girl twelve years old, who was believed to have a large multilocular cyst, but which had not been tapped. This also disappeared and left not a trace, at the end of a month. Here, again, we are permitted to doubt the accuracy of the diagnosis.

2. But, even if we admit the possible correctness of the diagnosis in these two cases, we may doubt if the cure is to be attributed entirely to the oxide of gold, since in connection with it were administered also tonics, Eau de Vichy, iron, quinine, frictions (especially of the iodides of lead and potassium) to the hypogastrium; diuretics both by friction and internally (as squills, digitalis, and the nitrate of potassa); and finally compression was methodically applied to the whole abdomen, by Bourjeaud's elastic bandage.[1]

Now, it must be admitted that all the remedies just mentioned uniformly fail in the treatment of ovarian cysts; and yet we must hesitate to ascribe the cure to the oxide of gold alone. But, remembering, however, that these remedies (excepting the gold) are precisely those found efficient in the treatment of ascites, we are disposed to set aside the oxide of gold and the idea of an ovarian cyst at the same time, in the cases under consideration.

Another case of ovarian cyst is reported as cured by Dr. J. Millar, in the *Edinburgh Medical Journal* for November, 1868; and in this instance the remedy was the bromide of potassium. The case had been attended by great pain, and tenderness, and dysuria, and other unusual symptoms. Patient had been once tapped, and eighty ounces of dark-colored serum had been removed. From the 6th to the 20th February, 1867, she took five grains of bromide of potassium three times daily, the tumor meantime refilling. Then the dose was increased to ten grains till the beginning of March (ten days), when the tumor had palpably diminished to a very small compass. During this time also the patient perspired profusely, and passed a large quantity of very dark-colored urine. The remedy was then suspended till the end of May (three months), on account of an attack of acute gastritis, when the tumor had regained its original bulk and rose to the epigastric region.

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[1] Boinet, p. 221.

She now commenced with fifteen grains of the remedy three times daily, and in three weeks her girth diminished from forty-eight to thirty-three inches. At the beginning of July (one month), only the shrivelled remains of the cyst could be felt per rectum. She was still taking ten-grain doses eight months afterward, when her case was reported, feeling that she would rather dispense with her ordinary meals than with the medicine.

It will be remembered that Dr. Millar subsequently reported another singular instance of tidal growth in an ovarian cyst, and for which I refer to page 72. I also refer to the instances before mentioned of subsidence of ovarian cysts during profuse diaphoresis or diuresis, though no remedies had been administered.

Prof. J. D. Miller, of Chicago, also reports three cases of recovery of ovarian cysts after prolonged treatment by bromide of potassium and iodide of potassium alternately; by chlorate of potassa, bitter tonics, nutritious diet, laxatives, and counter-irritation over the tumor. The cure was achieved in ten months and upward. It is not improbable that the pressure of pregnancy (a case of twins) aided the cure in the third instance.[1] At any rate, we must remark in regard to these three cases, as to Prof. Courty's two cases, that, if there really existed an ovarian cyst in each case, it is impossible to determine which remedy is entitled to the credit of the cure, and that essentially the same course has been tried over and over again in vain.

These eleven cases of reported cures of ovarian cysts by internal medication are the only ones which have come to my knowledge. Admitting, indeed, that they were actually cures by medication (as I do not think them to be), we must then offset these eleven against the many thousands of cases in which all medical treatment has utterly failed. Although, therefore, the chlorate of potassa has, up to the present time, the best reputation for this effect, there is no known remedy which can be at all relied upon for the cure of ovarian cysts.

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[1] *New York Medical Journal*, May, 1869, p. 176.

And, reasoning on anatomical grounds, we can expect none other than a negative result of mere medical treatment for the cure of ovarian cysts. For what agency would be likely to determine the remedy especially to and through the two arteries of the pedicle which alone usually carry the blood to the ovarian cyst, and thus to modify the nutrition of the latter? If a tumor, as large as an ovarian cyst in the third stage, were developed from the phalanges of one of the fingers, the proposition to remove it by internal medication would be accepted as simply absurd; and yet there would be as liberal a vascular connection in that case as there is in cases, without complications, of ovarian cysts.

Since, however, the latter increase more rapidly after the patient's health becomes decidedly impaired, much may be done by appropriate medication in the way of sustaining the general health during the growth of the cyst; and all the more urgent intercurrent symptoms should be met:

1. It is of prime importance to restore the normal activity of the kidneys, so far as possible, and most of the diuretics entirely fail us. I have for several years past relied almost exclusively upon the chlorate of potassa; the dose being ℥ ss. of a saturated solution *ter die.* Since it does not derange the stomach, it may be continued indefinitely. In a few instances it has seemed to arrest the growth of the cyst for several months. The iodide of potassium also sometimes succeeds as a diuretic for a time.

2. Constipation is to be overcome by appropriate laxatives; and, since inaction of the liver is its most frequent cause, a mild mercurial is generally, at intervals, required. The diminished appetite and digestion will require iron and gentian, or some other bitter tonic. The food must be bland and very nourish-

ing; the patient should be much in the open air, to compensate if possible for her diminished respiratory capacity, and every hygienic measure must be insisted on.

3. The skin must also be kept active by the use of warm baths, and warm clothing, especially by flannel next the surface. A flannel bandage may be applied, if needed for support; but not tightly, lest it favor adhesions. Iodine applications to the abdomen are of no avail.

4. I have, however, in several instances of late, apparently arrested the growth of ovarian cysts by the application indirectly, *per vaginam*, of the ointment of the iodide of lead to the cyst, beginning in the first stage, and when it was not much larger than the fist. But further trials must demonstrate how permanent is to be the benefit thus obtained.

Internal medication, therefore, at most, merely sustains the patient's health for a time, and thus somewhat postpones the fatal result.

SECTION II.

SURGICAL TREATMENT OF OVARIAN CYSTS.

The different modes of surgical treatment of ovarian cysts, which have from time to time been practised, may be included under the following heads:

I. Palliative Treatment.	Simple tapping.	1, per parietes abdominales. 2, per vaginam.
II. Curative Treatment.	A. Tapping followed by pressure.	
	B. Tapping followed by injection of iodine.	
	C. Formation of permanent opening in cyst.	1, externally. 2, per vaginam. 3, per rectum. 4, internally, by partial excision of sac.
	D. Ovariotomy, or entire extirpation of the ovarian cyst.	

I merely mention here also the application of galvanism to ovarian cysts, since Jobert de Lamballe recommended it, though subsequent experience has not confirmed his opinion of its value.

I. PALLIATIVE TREATMENT.

Simple Tapping.—Paracentesis abdominis has already been considered as an aid in diagnosis (p. 173); it here recurs as one of the procedures resorted to in the treatment of ovarian cysts.

Simple tapping of an ovarian cyst is to be regarded, in all cases, as a merely palliative measure; it is not to be expected that a cure will be thus obtained. In a very few instances, however, and usually after a single tapping, a cyst supposed to be ovarian has not refilled. But it may be the only resort in some cases; and, especially when, from the patient's very low state of health, or the condition of the tumor, the radical cure by extirpation is not to be thought of. But, if the tumor is not a monocyst, and the fluid is not decidedly serous, we may be quite certain the cyst will fill again, and in a much shorter time than at first.

The fact, however, has already been stated that serous cysts of the broad ligament are very often cured by a single tapping (p. 153); and probably most, if not all, of the supposed ovarian tumors which were cured by a single tapping, were really cases of this kind. I have never cured, nor seen cured, an ovarian cyst by any number of tappings; and I have never known alleged instances of the kind, the facts of which went to prove that the cyst was not of the broad ligament.

Still, we sometimes see cases of ovarian cysts which are a year, or even two or three years, in refilling after being tapped. Simple tapping in such cases, therefore, may indefinitely prolong the patient's life, and possibly render a resort to ovariotomy unnecessary. In these cases, also, the cysts are usually very large at the time of the first tapping, and the reaccumulation is quite rapid for three or four weeks, and then proceeds more gradually. I, however, recollect a patient who filled after each tapping at the regular rate of two pounds per day, till the next operation became necessary; in one instance secreting eighty-four pounds in forty-two days, and the next time one hundred and six pounds in fifty-three days. I also have the notes of another case, where I tapped four times at intervals of about a year, the patient remaining quite comfortable during the greater part of each interval; though the cyst was very large, and the quantity removed at the last two operations exceeds that obtained from any other patient whose case I find recorded. The amount I removed by the last tapping was one hundred and forty-nine pounds and three ounces of fluid by exact weight, her girth before the operation being six feet and one half (seventy-eight inches). The fluid filled a large wash-tub, and one and a half common-sized bucket besides—or seven and a half buckets in all. As I am positive that more than thirteen ounces of fluid was lost on the carpet, I might fairly say the weight was one hundred and fifty pounds. Simple tapping is therefore an important operation in the appropriate circumstances. "It may," as Dr. McDowell, the father of ovariotomy, more than fifty years ago remarked, "relieve dropsical tumors," though he adds that "the relief is only temporary, and is attended with no inconsiderable danger."[1] And the next inquiry is—

Is Simple Tapping a Dangerous Operation in Case of Ovarian Cysts?

It has been already stated that tapping in cases of ascites is very rarely followed by any untoward consequences, since there is no admission of an irritating fluid into the peritoneal cavity, and the puncture extends merely through the thinned abdominal walls. But the case with ovarian cysts is very different (p. 175); and the statistics of first tapping are in this connection very interesting and very important.

According to an essay published by Dr. Fock, of Berlin, in 1856, twenty-five out of one hundred and thirty-two, or one in five and a half, died within some hours, or a few days, after the first tapping. Prof. Kiwisch, of Würzburg, lost nine out of sixty-four, or very nearly one in seven, within twenty-four hours after the first tapping. Of nine cases of first tapping collected by Mr. Southam,[2] of Manchester, England, three died within a week, one in ten days, three more within one month, while the remaining two lived seven and eight months. The first four, or one in two and a fourth, died of the inflammation directly produced by the operation. Mr. T. S. Lee has a table[3] containing twenty cases of first tapping, of which one was relieved and left London, and one recovered, but filled again. Of the eighteen remaining cases, ten, or over one-half, died within seven days, from the immediate effects of the operation; two more died within two weeks; three within one month; and, of the remaining three, two died within two months, and the last one in twenty months. I learn, from several of the most experienced ovariotomists of this and other countries, that they do not consider tapping an ovarian cyst a dangerous operation. But the reasons are very apparent:

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[1] *Eclectic Repertory*, vol. ix., No. xxxvi., p. 546, October, 1819.

[2] *London Medical Gazette*, November 24, 1843.

[3] Page 177.

1. All of them, as a rule, never tap a polycystic tumor. Dr. McDowell, the first ovariotomist, maintained that, "in the attempt to draw off the contents of such a tumor with a trocar, it would be impossible to perforate all the vesicles; and such only as were pierced would discharge their contents. While one portion of the vesicles of the ovary would discharge themselves into the abdomen, another portion would remain diseased in the original way—thus compounding in the system two of the most deplorable diseases to which it is liable."[1]

2. Several American ovariotomists never tap even a monocyst, unless for diagnostic purposes. Dr. W. L. Atlee and Dr. J. P. White are of this number. Dr. H. R. Storer even gives, after Stilling, as the first of his "Ten Golden Rules of Ovariotomy,"[2] "never tap an ovarian cyst"—a precept too sweeping for adoption here.

But, if we confine our observations to the practice of general practitioners in this country, I doubt if a much more favorable report can be given than those of Dr. Fock and Mr. Lee. Dr. Meigs, of Philadelphia, stated that nearly one-half of the first tappings of ovarian tumors which he had witnessed had proved fatal.

The result of the preceding data is that, in Germany thirty-four out of one hundred and ninety-six die from the direct effects of a first tapping, or one in $5\frac{13}{17}$; while in England the figures are fourteen and twenty-nine, or one out of $2\frac{1}{14}$. The aggregate is forty-eight in two hundred and twenty-five, or one in $4\frac{11}{16}$. The greater mortality in England is probably due to a larger proportion of polycysts in the cases reported.

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[1] *Eclectic Repertory*, October, 1819, p. 546.

[2] *Journal of Gynæcological Society.* Boston, December, 1869, p. 338.

In these tables no distinction is made between oligocysts and monocysts on the one hand, and polycysts and dermoid cysts on the other. If we restrict the first tappings to the last two forms of cysts, it is very certain that the last figure is not too high to express the actual danger. This will become the more apparent when we consider the sources of the danger from paracentesis of ovarian cysts. They are the following:

1. The majority of those who die in consequence of a first tapping, die of peritonitis, produced either by irritation of the peritonæum by the fluid escaping from the cyst,[1] or by extension of inflammation from the puncture. But we have seen that the fluid of oligocysts is more bland, and not very unlike that of the peritoneal cavity; while the fluid of the polycyst and the dermoid cyst is far more irritating.

2. Hæmorrhage from wounding a vessel in the cyst-wall may also prove fatal. Kiwisch records two such cases (p. 140). But the walls of polycysts and dermoid cysts are far more vascular than those of oligocysts and monocysts. And the danger is also still further proportionally increased if more than one of the cysts of a polycyst are punctured.

3. Inflammation of the cyst-wall is a not uncommon cause of a fatal result of the operation. The greater vascularity just mentioned makes it far more common in the polycyst and dermoid cyst. Indeed, Cruveilhier, many years ago, detected this tendency in ovarian cysts, without the ability at that time to make this discrimination. He even maintained that inflammation of the cyst-wall (and not peritonitis) is always the cause of death after tapping.[2]

4. Hæmorrhage from the puncture through the abdominal walls sometimes proves troublesome, and has, though very rarely, proved fatal. Or a vessel may be struck in the omentum, if it chance to intervene between the abdominal walls and the cyst at the point of puncture, and fatal hæmorrhage may ensue. Fortunately, the omentum is usually pushed up so far by the cyst as to be out of danger; but in a case operated on by myself, and reported several years since to the New York Pathological Society, the omentum had become adherent to the

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[1] Mr. Wells claims that his siphon trocar prevents this.

[2] *American Medical Monthly*, 1857, p. 24.

iliac fossæ before the cyst was developed, and consequently covered its entire anterior surface. A vein of the omentum, at least one-quarter inch in diameter, was punctured by the trocar, and the patient sank from hæmorrhage within eighteen hours afterward. This position of the omentum also obtained in a case of polycystic tumor which I removed by ovariotomy.[1]

Taking all the preceding facts into account, I think we may assume that, in case of polycysts alone, at least one-half die of a first tapping; while of oligocysts and monocysts alone, unless the operation is performed as a last resort, and when the patient is almost entirely exhausted, the danger is very slight. I have myself lost four patients out of sixty-three from the first tapping of monocysts and oligocysts. But of these two were too weak to rally at all after the operation, and one was a colloid cyst, before alluded to (p. 175). The remaining one died from peritonitis from exposing herself in opposition to my directions. Omitting the first two cases, my fatality is one in thirty and a half in case of oligocysts and monocysts. I think Velpeau must have confined the operation to monocysts, since he states[2] that he tapped at least three hundred and ten times in thirty years, and had lost but four patients closely after the operation, or one in seventy-seven and a half—one and a half per cent. He does not, however, state the number of his first tappings included in this enumeration; but, as he operated thirty-eight times upon one of his patients, they might have been less numerous than his figures would at first lead us to suppose.

During the last six years I have not tapped a polycyst, except as an aid to diagnosis, and with the understanding that ovariotomy should be at once performed, if thought advisable, because any threatening symptoms arose. In one case the diagnosis was thus settled, and the operation of ovariotomy deferred for two or three weeks till the patient should acquire more strength. Symptoms of peritonitis, however, appeared on the fourth day, ovariotomy was performed on the fifth, and the patient saved. Doubtless it is generally better to remove the polycyst at once after the tapping. A patient tapped for the same purpose, by the late Dr. G. T. Elliot, at the Bellevue Hospital, died before the time appointed for ovariotomy, forty-eight hours afterward, had arrived.

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[1] *American Journal of Medical Sciences*, July, 1864.

[2] Discussion of French Academy of Medicine, on Ovariotomy, October, 1856, *Bulletin de l'Académie*, tome xxii., p. 85, etc.

But why is the first tapping so much more dangerous than subsequent ones? Simply because it determines the character of the cyst and of its contained fluid; and it may have succeeded in case of a polycyst because it was already adherent at the point of puncture. If it be a monocyst, there is very little danger, if the patient's strength is still good; if it be a polycyst, there is great danger in all conditions. I should add also that each subsequent tapping is very dangerous in case of a polycyst; though not so in case of a monocyst. Hence the number of tappings which have been survived has in some instances been astonishing. I have already given several examples (p. 41). Dr. Bamberger also reported a case of two hundred and fifty-three tappings in eight years; and Kiwisch speaks of one hundred tappings in less than one year.

In view of the fact that so many die of the first tapping in case of ovarian cysts, it is not strange that the writers of the last and the preceding century were opposed to it in the treatment of ovarian dropsy. Morgagni[1] and De Haen were decidedly opposed to it; and the ancient physicians seem also to have recognized the danger of a first tapping, and deferred it as long as possible. Kiwisch therefore discussed the question whether life is not shortened by tapping in case of ovarian tumors, and concludes that it does shorten life. I. B. Brown also indorses this conclusion. In respect to polycystic ovarian cysts, there should no longer be any doubt of its correctness.

Reserving tapping, therefore, as a mere palliative measure in cases exclusively of monocysts, and of oligocysts where there are only two or three large cysts, we may deduce the following conclusions:

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[1] "Certe autem junior Verneyus, Chirurgus, siquis alius, in paracentesi exercitatissimus disertè negat, se ullam quae saccato hydrope teneretur, vidisse sanatam, quin plures, quae satis bene valentes, nullâque aliâ nisi onerosis ventris, molestiâ pressae, cum ab hâc per eductam aquam liberare se vellent, brevi ait perisse, diu caetero quin imo interdum diutissime, ut saepe indicata exempla ostendunt, victuras; sed et alii passim viderunt, paracentesim in his morbis citam mortem esse consecutam."

"Mitto caetera; nam vel ex hisce jam satis, superque intelligis cur hic paracentesis non modo inutilis, sed et noxia miserae mulieri contingat."

"De Sed. et Caus. Morb.," Lib. 3, Epist. xxxviii., Art. 68.

1. In case of patients extremely exhausted, and evidently not able to sustain the risks of ovariotomy, it may be resorted to, to give relief for the last remaining days; or with the hope that the patient may afterward rally sufficiently to incur the risk of the radical operation.

2. It may be performed to relieve the patient for the present, in less urgent circumstances; it being desirable, for some sufficient reason, not to perform ovariotomy for several months to come.

3. But it should never be resorted to as a palliative until the patient suffers from the size and pressure of the cyst, and till the respiration or digestion (or both) is decidedly interfered with.

4. Tapping may be necessitated in cases of pregnancy complicated with ovarian cyst, or during parturition with this complication, and this irrespective of the kind of cyst.

5. Tapping should not be performed in case of a polycyst, except for the purpose of deciding the diagnosis, and with the expectation of promptly performing ovariotomy if any graver symptom arises.

How should Simple Tapping be performed?

Understanding the sources of the danger of paracentesis abdominis, in cases of ovarian cysts, means should be adopted to avoid them so far as possible. Attention is therefore called to the following practical points:

1. I should advise to use a trocar and canula of larger size than is generally used, at least as large as a No. 13 bougie, if the cyst be of considerable size, to admit of injecting the cyst, if necessary.

2. Always see that the bladder is evacuated before the operation is commenced, and that pregnancy does not exist, and prove by percussion that no intestine lies in front of the cyst.

3. No bandage around the patient's abdomen during the operation, as usually advised, is actually necessary. Pressure by the hands of an assistant is, I think, to be preferred. After the operation, however, a bandage is always proper.

4. It is generally recommended that the patient be in a sitting position during the operation, while Prof. Simpson and I. Baker Brown adopt the recumbent position, the patient also lying on the side. Each of these positions has its advantages in special circumstances. I adopt the following rules in this respect: (1.) If the tumor is monocystic, I would, *cæteris paribus*, prefer the sitting posture. (2.) If the tumor is polycystic, I would adopt the sitting or the recumbent position, according as either would best secure the complete evacuation of the cyst, in each particular case, and should expect to resort to the recumbent position in a majority of cases. But (3.), if the patient were so much debilitated that syncope is very probable, I would put her in an horizontal position, irrespective of the nature of the tumor.

5. I generally incise the skin with a lancet or scalpel, before using the trocar and canula, and always, if there be a thickness of half an inch or more of areolar and adipose tissue to penetrate. Of course large cutaneous veins are to be avoided. If there be œdema, press firmly upon the surface where the trocar is to be introduced, with the point of the finger, for a minute or more, before using the instrument.

6. The place selected for the puncture by most operators is the point in the linea alba midway between the symphysis pubis and the umbilicus. I. B. Brown, however, prefers to puncture in the linea semilunaris, the patient lying upon the same side. (1.) In case of a monocystic tumor, I should prefer to puncture at the point in the linea alba just indicated, as the point least liable to be crossed by a vessel of sufficient size to give trouble. (2.) But, if the tumor be polycystic, I would puncture at any point on the anterior aspect of the abdominal walls, above the level of the anterior superior spinous processes, and below that of the eighth rib, which promised the freest evacuation of the cyst to be punctured. (3.) Having once safely operated at any particular point, I would perform all subsequent tappings at the same point, if practicable. I have tapped at almost every point within the limits just mentioned, and have never had any troublesome hæmorrhage, except in a single case already mentioned, and in this the puncture was made in the linea alba, as before specified.

If the puncture is made above the level of the umbilicus, the probable risk is also incurred of puncturing the omentum. If there be an umbilical epiplocele together with ovarian cyst, this will necessarily be done.

In former years, I sometimes tapped four different cysts of a polycyst at as many different points on the abdominal walls, at the same time, without any subsequent trouble, and have tapped four or five cysts with a curved trocar, all through the same opening, with similar impunity to the patient. I now caution all young surgeons against the repetition of this part of my experience.

Some operators recommend that the puncture be made *per vaginam*, as was first done by Callisen in 1795.

But there are three considerations which I think sufficient to deter us from simple tapping of an ovarian cyst *per vaginam*, as a palliative measure, under all ordinary circumstances; though Huguier advocates it, and thinks the danger has been magnified. These are: (1.) The vessels of the tumor are larger and more numerous at its lower part. (2.) If polycystic, the largest cysts are not at its lowest part. (3.) There is greater risk of wounding other organs by tapping *per vaginam*. Exceptional cases may, however, arise. Distinct fluctuation and evident thinness of the walls of the cyst, detected *per vaginam*, may justify the operation through that canal in case of a monocystic tumor; and in case of one of the cysts of a polycystic tumor being developed downward, so as to occlude the vagina in a married woman, this cyst may be in like manner evacuated. I have twice performed the operation in the circumstances just mentioned, in both instances, however, without any permanent benefit till I also, in one of them, injected the tincture of iodine. The cyst had not refilled five years afterward, when I last had an opportunity to ascertain the fact.

There is, however, a class of ovarian tumors in which simple tapping *per vaginam* is proper. I mean those complicated with ascites, and in which the ascitic fluid, passing downward into the Douglas *cul-de-sac*, produces prolapsus of the vagina to a greater or less extent. Then the protrusion of the posterior vaginal wall, with the fluctuation, directly invites the operation. I have several times performed it in such cases, and never with any unpleasant results. But here the fluid is not in the cyst, but in the peritoneal cavity. I have never seen an ovarian cyst directly produce prolapsus of the vagina.

7. Lastly, I should evacuate the cyst as nearly as possible before removing the canula; and, if the fluid is very viscid and albuminous, I would also thoroughly wash it out with warm water. A small amount of fluid almost always escapes into the peritoneal cavity, unless these precautions are taken.

Since instances not seldom occur in case of polycysts in which the contents of the cyst are too viscid to flow through such a canula as I have recommended, or a false membrane within the cyst may, itself not being punctured, at once close the puncture through the cyst-wall, the operator will, of course, first pass a long probe through the canula to remove the obstruction, whatever it may be. Failing still, he may assume that the contents are a dense colloid mass, and obtain, only after repeated efforts perhaps, some particles of it for examination, upon a wire passed double through the canula, so that the loop at its farther end may entangle a little of it. This substance, however, offers so little resistance to the wire as sometimes to suggest that the latter must be free in the peritoneal cavity. But the search for cystic contents of some kind is only to be relinquished when meantime sufficient evidence has accumulated to satisfy the operator that he has made the mistake of puncturing a solid tumor.

8. Finally, a proper bandage is to be applied, and the patient kept quiet in bed for several days, according to the subsequent symptoms.

II. CURATIVE TREATMENT OF OVARIAN CYSTS.

A. **Tapping followed by Pressure.**—This plan of treatment of ovarian tumors was suggested by I. Baker Brown in 1844, and his cases were reported in the *The Lancet* from that year to 1859. The prime objection to it is the suffering it gives the patient, though Mr. Brown asserts that, if his method be adhered to, it is by no means so unbearable as some have reported it to be; in fact, that it is generally not productive of any decided discomfort. The following is his own account of his operation, which, like any other, may fail, he remarks, from in-attention and carelessness: "First of all, compresses of linen or lint should be so arranged as to present a convex surface, adapted as nicely as possible to the concavity of the pelvis. Over these compresses straps of adhesive plaster should be applied, so as to embrace the spine, meeting and crossing in front, and be extended from the vertebral articulation of the eighth rib to the sacrum. Over this strapping, either a broad flannel roller, or, still better, a band with strings and loops which tie in front, may be applied, or a well-made bandage, which, by lacing in front, may be gradually tightened. These bandages must be prevented from slipping upward, by a strap around each thigh. Both the compresses and the bandages will require watching and adjusting from time to time, lest by unequal pressure the bowels or bladder be subjected to inconvenience. Also the crest of the ilium should be guarded with thick buffalo-skin or amadou plaster."

Mr. Brown frankly admits that he at first anticipated too much from this mode of treatment, since, in many of the cases supposed to have been cured, the sacs subsequently refilled. He, however, reports six successful cases in his work on ovarian dropsy (pp. 79–86), the first three of which continued well at the end of fourteen, twelve, and eight years. The other three cases had not relapsed at the end of one, three, and three years.

This is to be regarded as a merely palliative measure, and should be very seldom, if ever, resorted to.

B. **Tapping followed by Injections of Iodine.**— The distinction of having been the first to cure an ovarian cyst by the injection of iodine has been assigned to Dr. Alison, of Indiana. This was in 1846.[1] This method of treatment had been first suggested by Velpeau, in 1839,[2] from the well-known effects of iodine injection in cases of hydrocele.[3] It was first performed in France, by Boinet, in 1847, upon one of the patients of Robert, surgeon of the Hôpital Beaujon.[4]

Denman, Bell, and Hamilton, had injected ovarian cysts many years before with sulphate of zinc, port wine, and other irritating fluids, but with such disastrous effects that the practice had been given up.

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[1] *Edinburgh Medical Journal*, vol. xxxiv., 1849, p. 68.

[2] "*Traité de Medecine Opèratoire*," tome iv., pp. 7, 13.

[3] This was first suggested by Martin, in 1832.

[4] Boinet, "Maladies des Ovaires," p. 241, note.

Many operators, and especially in France and Germany, where ovariotomy until quite recently found very little favor, have used iodine injections in the treatment of ovarian cysts. They were also, and are still, though very seldom, resorted to in Great Britain. But M. Boinet took up the subject so enthusiastically, and carried it on so scientifically, that to him is due the credit of rendering it a recognized operation in the treatment of ovarian cysts.

To what Class of Cases is this Treatment adapted?

We can, evidently, never expect to inject all the cysts of a polycystic tumor; and, if we could succeed in arresting the development of even several of them, this would only make more sure the increase of the smaller ones in their turn. This is, therefore, a procedure not to be at all relied on, except in cases of monocysts. Of eleven cases of polycystic tumors injected by Boinet, several years ago, six died, and five remained unchanged, and were considered incurable; while, of thirty patients with single sacs, treated by iodine injections, twenty-four were cured, three seemed to be for a time, but relapsed, and three died. Still, it has sometimes been found that the development of a polycystic tumor has been for a time arrested by injecting one or more of the largest sacs. In case also of one of the sacs of a compound cyst occluding the vagina or the rectum by its pressure, we may, perhaps, check the development of the mass in that direction by the method under consideration. I have succeeded in thus entirely removing pressure from the vagina in a single instance, as already stated. It will, however, be seen from the results of Boinet's experience, that this operation, in case of polycystic tumors, totally fails to cure, besides being even more dangerous than ovariotomy. With the possible exception just mentioned, therefore, it will be understood to be restricted to monocystic tumors.

But are all monocystic tumors appropriate for the injection of iodine? Certainly not; for—

The nature of their contents exerts a great influence on the result of the operation. If the fluid is very dense and highly albuminous, oily, or gelatinous, the operation will not succeed. Inflammatory products, such as flakes of fibrine, render its success very improbable; though if there be pus alone it generally succeeds. If the contents are merely stained by blood, it also succeeds. If the cyst be adherent, the iodine injection will not succeed, since the cyst cannot be made to collapse. And it may not collapse if the walls are very thick.

There remains, then, for the iodine injection only the simple monocyst, without complications of any kind as to its walls; with a clear serous, a sanguineous, or a purulent fluid. And the last variety is cured by this method about as certainly and as promptly as the two preceding.

It is, however, impossible to decide as to the existence of adhesions previously to a tapping, if even then; and this operation will sometimes show a cyst to be plural which was previously believed to be a monocyst. If, however, the tapping proposed to be followed by the iodine injection demonstrates either of these conditions, no injury will have been done, and the case will then be set aside for ovariotomy, or for treatment by the method next to be explained.

It has been shown that a first simple tapping of an ovarian cyst is a more dangerous operation than has generally been supposed, though very much less so in case of a monocyst. It does not, however, appear from the experience of Boinet that the risk is at all increased by the subsequent injection of the iodine into the cyst. This, however, depends mainly upon the care and precision with which the operation is performed.

The Curative Results of Iodine Injections.

While this treatment was applied with little discrimination to the different kinds of cysts, the results were, as might be expected, various. Velpeau thought, in 1856,[1] that if the cases were well selected, one-half of them were cured; while Dr. Simpson reduced the number to about one-third. According to statistics laid before the French Academy of Medicine in that year, of one hundred and ten cases treated by iodine injections, sixty-four (or nearly three-fifths) were cured, thirty-six were not relieved at all, or only temporarily, and ten (one in eleven) died.

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[1] *American Medical Monthly*, 1857, p. 310.

Dr. Gibb saw three cases cured out of five.[1] Cruveilhier stated that Nélaton cured four cases out of ten or twelve, the four cases having serous and the others albuminous contents; while Boinet cured twenty-four out of thirty patients, by thirty-two operations, having also three relapses.

Not all the operators, however, had the success just mentioned; and some of the preceding cases very probably refilled after two or three years, since this is a common occurrence. Dr. Tyler Smith cured only two cases out of twelve, nine cases having refilled, and one having died within forty-eight hours. I. B. Brown reports two cases cured of about a dozen (pp. 86, 92). Of five cases injected by Mr. Spencer Wells, two remained apparently well at the time of the report two years afterward; one began to refill after two years, and was again injected; another refilled twice, and was to be injected a third time, and in the remaining one secondary cysts of a large size were subsequently developed. Of six cases of my own, two were cured, three refilled, and one died. Jobert considers the operation quite a harmless one, and Cruveilhier states that he has operated thirty times without any accident. Prof. Simpson has had but one death in twenty or thirty cases. I have had one death in six cases, though perhaps not fairly attributable to the operation itself. Scanzoni operated four times, and all four of his patients died. It must not, therefore, be looked upon as so harmless an operation as it is represented to be by Jobert. If, however, restricted to the kind of monocyst I have indicated, and the operation be properly performed, the fatality is very slight, as will be seen.

But we are to judge of the curative results of this method of treatment at the present time by reference to the experience of M. Boinet, who, since he restricted it to the kind of monocysts before mentioned, and where, he remarks, "one is almost always sure of a radical cure" (p. 278), has had about ninety cases of success out of one hundred, and twenty-seven out of his last twenty-nine operations.[2] Of his first one hundred cases, he had only sixty-two cures, twenty-two failures, and sixteen deaths; though only four of the sixteen died within a few days, and from the operation alone. Of the twenty-two failures, the majority were decidedly benefited, and life was prolonged for five or six years. Of the sixteen who died, ten had polycysts, and one an areolar cyst. Of the twenty-two failures, twenty were cases of polycysts.[1] Of the thirty-eight cases of failure and death, thirty-three at least were cysts which Boinet would now reject as incurable by this method of treatment. Restricting the number to the proper cases, his success was, therefore, sixty-two cures out of sixty-seven cases.

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[1] *American Medical Monthly*, 1857, p. 251. [2] "Iodothérapie," second edition, p. 664.

Taking this one hundred cases in the order in which they were performed, he had the results above mentioned, from three hundred and thirty-four tappings, and three hundred and twenty-seven iodine injections, as follows:

No. of Operations.	No. of Cases.[2]	Cures.	Failures.
1 tapping and 1 injection	45	37	8
2 tappings " 2 injections	18	10	8
3 " 3 "	8	5	3
4 " 4 "	10	3	7
5 " 5 "	3	None.	3
6 " 6 "	7	4	3
9 " 9 "	3	1	2
15 " 15 "	1	None.	1
17 " 17 "	2	1	1
20 " 20 "	1	None.	1
26 " 19 "	1	None.	1

Here are sixty-one cures and thirty-eight failures. The operation did not produce any unpleasant result in a single instance. Several of these cysts were polycysts. It may be added that in all cases, if no benefit has resulted from this treatment, the patients are left in as favorable a condition for ovariotomy as they were before the treatment was commenced. An oligocyst of three or four cysts only may be treated by iodine injections, only one cyst being injected at a time. If the first operation does not succeed, a second is resorted to, when the cyst is about half filled again. Boinet would prefer to make the first operation while the cyst is small, and as soon as fluctuation can be felt; but does not decline any case on account of the size of the cyst.

The Form and the Strength of the Iodine Injection.—Solutions of iodine of very different degrees of strength have been injected into ovarian cysts by different operators. M. Bonnet, of Lyons, who generally kept the catheter *in situ* for some days or weeks, and repeated the operation several times, used, at first, a mixture of 100 parts of water with 100 of tincture of iodine and 4 of iodide of potassium ; he afterward doubled the proportion of tincture, and, when the cyst is considerably lessened, used the pure tincture. Prof. Simpson sometimes used the liquor iodinii compositus (Ed.) (8 grains iodine and ʒ ss potassii iodid. to ℥ j water); and sometimes the tincture of iodine (Ed.) (ʒ ss to ℥ j alcohol). This tincture is one-quarter stronger than that made according to the U. S. formula. Dr. Bellows, of Cork, successfully used ʒ ij tinct. iodinii comp. to ℥ j of distilled water. I. B. Brown used the undiluted Edinburgh tincture, as do most of the English operators. I used the U. S. tincture undiluted.

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[1] Though some of them were decidedly benefited for a time.

[2] Only ninety-nine cases are here given.

The quantity of the fluid used has varied with the size of the cyst and other circumstances, from one ounce to even fourteen ounces. Sometimes the whole amount injected has been left in the cyst; at others, most of it has been passed out before removing the canula ; for, with the exception of M. Bonnet, operators have removed the canula (or bougie) on completing the injection. I have removed most of the tincture, after assuring myself that I had brought it into contact with the whole lining membrane of the cyst, believing that no advantage can accrue from leaving several ounces to be absorbed, while serious disadvantages may result. For—

1. Only the portion in contact with the cyst exerts any change upon it; and any considerable overplus, especially if the cyst be distended, increases the risk of some portions passing into the peritoneal cavity—a serious accident, as will be seen farther on.

2. There is no advantage in leaving in the cyst more than enough of the solution to cover its internal surface, though more may have been at first injected, to make sure of its contact at every point. On the other hand, the danger above mentioned is thus greatly increased; while at the same time the absorption of so large an amount of iodine, besides being totally useless in itself, generally produces great prostration and prolonged vomiting, which in a feeble patient might induce fatal consequences.

3. The use of a small quantity of the solution, and this mostly withdrawn in a few minutes, has been actually found quite as successful as the opposite practice.

Boinet uses the following formula, and the same quantity, whether the cyst is large or small—containing 2 lbs. or 50 lbs. of fluid (p. 276). Gradually increasing the strength as the case goes on, he does not hesitate at length to use the pure tincture of iodine with the iodide of potassium still added:

Distilled water	(100 parts),	℥iij and ʒj
Tincture of iodine (Codex) . .	(100 parts),	℥iij and ʒj
Iodide of potassium . . .	(4 or 5 parts),	ʒj to ʒj¼
(Or tannic acid	(1 or 2 parts),	grs. xv to grs. xxx)

How to perform the Iodine Injection.—A somewhat complicated apparatus is described by Dr. Simpson,[1] of which the object is to exclude the air from the interior of the cyst during the operation. Boinet uses merely a large trocar and canula; a gum-elastic catheter, with four to six large lateral openings, accurately fitting the latter; and a syringe, the nozzle of which is accurately adapted to the catheter. He performs the operation in the following manner, and considers every point specified as important in guarding against grave and even fatal accidents:

> The puncture is made by the large trocar on the side on which the cyst commenced, and as near its point of origin as possible—i. e., immediately above Poupart's ligament. The trocar is withdrawn, and the fluid allowed to flow, the canula remaining in place, without the least movement of the patient, or pressure upon the abdomen. When about three-fourths of the liquid has come away, the gum-elastic tube is passed through the canula and to the bottom of the cyst, and the canula withdrawn. As soon as the cyst is evacuated the injection is made, provided the fluid is serous and limpid; otherwise the cyst is previously washed out with warm water. The injection should remain in the cyst from five to ten minutes, and then be withdrawn. A little will of course remain, but produce no inconvenience. While the injection is remaining in the cyst, the latter may be slightly kneaded, and the patient may take different positions, in order to bring the former into contact with every part of the wall of the cyst. This contact produces no pain.

These manipulations being accomplished, the catheter is next to be withdrawn. And at this point of the operation several important precautions are to be taken; and which will be particularly insisted on. For, if the tube be rudely withdrawn, its advantages are lost, and grave, even fatal accidents may result.

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[1] "Clinical Lectures on the Diseases of Women," New York, 1872, p. 477.

The advantages of the gum-elastic tube, used instead of the canula of the trocar, are numerous: 1. Being passed as far as possible into the interior of the cyst, there is no danger of its being drawn out of the latter if it retracts, as has happened with the too short canula. 2. Being much longer than the canula, it forces such a connection between the cyst and the abdominal wall as to allow of the kneading of the cyst without fear of the escape of the tincture of iodine into the peritoneal cavity. 3. Leaving the syringe attached to the outer extremity of the catheter while the injection remains in the cyst, in order to prevent its flowing out, it will not only draw out all the tincture of iodine in the cyst, and also remove the air if any has entered, but it will also even draw the walls of the cyst into contact.' 4. While removing the catheter, the syringe must still remain in its hermetical connection with it, and continue to draw the contents of the cyst through it, until the tube is completely withdrawn.

The withdrawal of the catheter, armed with the syringe, demands particular care. To avoid the escape of the fluid of the cyst, or the injection, into the peritoneal cavity, or the introduction of air into the cyst, it should be done in the following manner: First, slide the thumb and forefinger of the left hand along the tube down to the surface of the abdomen, and gently press against the latter till the abdominal wall at that point comes into immediate contact with the wall of the cyst, leaving no interval between them. Then, these two walls touching each other at all points around the catheter, withdraw the tube quickly with the right hand; or, still better, let an assistant withdraw it: while pressing as before with the left hand, the right hand produces the vacuum with the syringe while still withdrawing it with the tube. Having done this, the left hand still presses upon the abdomen for a few minutes, to keep the abdominal wall in contact with the cyst, and to allow the opening made by the trocar to close up. Before removing this pressure, the patient is placed upon the side opposite to the puncture, to prevent any flowing of fluid from the cyst if it still contains any. This position must be maintained for twenty-four to forty-eight hours. Lastly, a piece of diachylon or a layer of collodion is applied over the puncture, and upon this graduated compresses, in order to keep the abdominal wall still in contact with the cyst. A bandage properly applied completes the dressing required (pp. 248–251).

The Symptoms following Iodine Injections.—It was predicted that the most fearful effects would follow the injection of iodine into ovarian cysts, and the experience of some operators certainly seemed to confirm the prediction. Since, also, all the iodine left in the cyst is to be eventually absorbed, we should expect severe symptoms from the large quantities sometimes used.

The rapidity of absorption is sometimes astonishing, since the taste of the iodine may be perceived in a few minutes by the patient, and in half an hour the iodine may be discovered in the urine, the sweat, the saliva, the tears—in short, I. B. Brown remarks, in every secretion of the body. In his own cases also, five or six ounces of the solution having been left in the cyst, great prostration and vomiting ensued, which were removed in seventy-two hours or more by the use of stimulants.

It was also assumed that the iodine injection produces the cure, if at all, by exciting an inflammation within the cyst. This is now known not to be the fact: it simply modifies the structure of the lining membrane of the cyst, and its secretion, until the latter ceases. Sometimes in case of cure a small hard tumor remains; in others, not a trace of the previously existing cyst.

Boinet, who, as he remarks, has performed this operation by hundreds,[1] and more than a thousand times[2] in the presence of his *confrères*, unqualifiedly asserts that the injection of the tincture of iodine into an ovarian cyst never produces pain; while it always produces intense pain if it falls, in the least quantity, into the peritoneal cavity. He maintains, therefore, that in all the cases reported by operators as suffering intense pain from this cause, they actually introduced the iodine, or let it pass from the cysts into the cavity, of the peritonæum. And this mistake might occur in several ways and be overlooked.

1. Too large a quantity of the injection being left in the cyst, a portion of it may escape into the peritoneal cavity on the withdrawal of the catheter.

2. Sometimes ascites coexisting with ovarian cyst, and a layer of fluid intervening between the cyst and the abdominal walls, the former is not reached at all by the trocar as the operator intended, and the tincture of iodine is injected directly into the peritoneal cavity.

3. Or an encysted hæmatocele may be mistaken for an ovarian cyst, and pain will be produced by injecting the iodine.

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[1] "Par centaines," p. 267.

[2] "Plus de mille fois," p. 237.

The result will not, however, be fatal in such a case, but may be curative. Boinet records such a mistake against himself, which resulted fortunately.

4. If the canula of the trocar has been used instead of the longer catheter, it may have been displaced from the cyst by pressure on the abdomen, or by movements of the patient, and thus the iodine may have entered the peritoneal cavity. Or, the few drops of the tincture in the canula may fall from it into that cavity, while the latter is being withdrawn.

Many patients have no sensation at all at the moment of the injection; others have a slight sensation of heat. If there be a decided pain, there has been a slight, perhaps the very slightest, contact of the tincture with the peritonæum. If it becomes very severe and persists longer, there is reason to fear that much or all of the tincture has entered the peritoneal cavity; and the consequences may be serious, and, indeed, are very often fatal.

Sometimes almost instantly, and in other cases after several hours, the patient has a taste of iodine in the mouth; rarely nausea or desire to vomit; sometimes a headache, a slight *malaise*, or a general restlessness; at other times, agitation, sleeplessness; in a word, all the symptoms of iodism, and not of iodine intoxication. All these symptoms are, however, of no importance, and disappear spontaneously within twenty-four hours. Iodine-poisoning never occurs, nor does gangrene ever ensue; even if the whole injection is left in the cyst, there is not the least occasion for alarm. The iodine symptoms are only somewhat more pronounced.

M. Boinet gives the following conclusions respecting the mode of treatment under consideration (pp. 280, 281):

1. "One or several tappings followed by iodine injections, in case of ovarian cysts, have never presented the least danger, whether they were unilocular, simple, or complicated and multilocular.

2. "These injections, in case of simple cysts, have almost always produced a cure; and often a remarkable amelioration in cysts not possible to cure, as multilocular cysts.

3. "Simple unilocular cysts, with a watery, citrine, sanguineous, or purulent fluid, whatever their size, are often cured by

a single tapping and injection; and our last twenty-nine operations have given twenty-seven cures.

4. "Several tappings and several injections may be practised in succession upon the same cyst without inconvenience.

5. "It is important to inject ovarian cysts early, and before they acquire a large development, contract adhesions, and have impaired the general health."

Thus far M. Boinet on iodine injections, and in 1865. But to decide in advance that a given ovarian cyst is a "single and in all respects totally uncomplicated" cyst, is quite impossible; and there are but very few ovarian cysts, respecting which the surgeon is consulted, which have not already attained to the second or even the third stage. Besides, many cysts, with a perfectly clear fluid, are cured as has been shown, by a single tapping alone; these being cysts of the broad ligament, though often mistaken for ovarian cysts (p. 100).

We may therefore receive the laudations of iodine injections after tapping, as a curative measure, in case of ovarian cysts, with some degree of reserve. And Mr. S. Wells, at a meeting of the Royal Medical and Chirurgical Society of London, remarked, in 1869, that he had recently conversed with M. Nélaton and M. Boinet, who had both, after a large experience, come to the same conclusion to which his own experience in seven cases led. Only one of his seven patients was then alive who had not subsequently undergone ovariotomy. This one was still in tolerable comfort, ten years after the injection; but quite a large cyst could still be felt. He thought injections of iodine should be restricted, in case of monocysts with viscid contents, and, of all polycysts, to instances for some reason not admitting of ovariotomy, but where a cure may be hoped for from suppuration and drainage.[1]

In the history of the surgical treatment of ovarian cysts, iodine injections naturally precede the bolder operation of ovariotomy. And there was nothing better for France so long as ovariotomy was universally anathematized by the profession there. But a change has occurred since 1862, of which the causes will appear farther on.

In Austria, therefore, where ovariotomy has hitherto been crowned with but small success, and is but seldom performed, iodine injections have been and still are frequently resorted to; though the advent of Billroth at Vienna is changing public opinion in favor of ovariotomy. Dr. S. Fürst reports eight cases treated by Dr. G. Braun, of Vienna, in this way.[1] He adopts the views of Schuh, and operates while the patient still presents a healthy appearance; the cyst being unilocular, thin, roundish, equally resistant, and not too large, with serous, yellowish-gray, or somewhat brownish-red contents:

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[1] *Medical Times and Gazette*, May 29, 1869.

Case I.—Unilocular, very large cyst. Tapping and injection of iodinii tinct. $1\frac{2}{3}$ oz.; potassii iodidi 56 grs.; aquæ destillatæ $4\frac{11}{16}$ oz.[2] Complete cure. Pregnancy and normal delivery two years afterward.

Case II.—Large unilocular and rather tense cyst, with thin walls. Cured by one injection.

Case III.—Thin-walled, unilocular cyst, size of man's head. Cured by one injection.

Case IV.—Unilocular thin-walled cyst. One injection. Cure.

Case V.—Unilocular cyst, extending to umbilicus. Injection. Cure.

Case VI.—Cyst size of a man's head. Tapped *per vaginam*. Injection. Cure.

Case VII.—Unilocular cyst right side; lateroflexion of uterus to left. Rectocele. Injection twice *per vaginam*. Slight constitutional symptoms. Cure.

Case VIII.—Unilocular cyst. Considerably diminished by injection, but attains former size after nine months. Ovariotomy; death. Several cases are also mentioned as cured by Pitke, Habit, and Dittel.

C.—**Tapping followed by the Maintenance of a Permanent Opening into the Cyst.**—1. This idea was first carried into practice by Ledran, in 1836, who made an incision (about four inches long) through the abdominal walls into an ovarian cyst, and kept it open by pledgets of lint, and a canula of sheet-lead, for five months. The patient ultimately recovered. In another case, the discharge continued two years, with a like result. It was proposed by Recamier, in 1824, to produce adhesion of the cyst to the abdominal walls by the application of caustic potassa, before making the incision, which method has been adopted by Tilt, Pereira, and others. This operation is, however, more fatal than even ovariotomy, and can properly find a place only in some cases perhaps in which ovariotomy is rendered impossible by the existence of very extensive adhesions.

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[1] *Wiener Medical Presse*, October, 1869, pp. 18, 23.

[2] I. e., 60 grammes, 3.75 grammes, and 150 grammes.

Mr. Bryant, of St. Thomas's Hospital, reports two cases treated in this way, of which the first was successful. In the second, ovariotomy had been attempted by another surgeon, the cyst subsequently sloughed, and recovery unexpectedly ensued.[1]

2. The same principle is, however, carried into effect in a somewhat less objectionable way by tapping the tumor in the usual way, or *per vaginam*, or *per rectum*, and leaving the canula *in situ* till the cyst collapses and the discharge finally ceases. Of course, an exhausting discharge for months or years ensues, as in case the incision is used; and the result is so generally fatal that I can only in exceptional cases recommend the practice. It should be applied to monocysts only, and the smaller the cyst the greater the chance of final success. Briquet tried this method several times, but suppuration almost always destroyed his hopes; and Dr. West had almost fatal peritonitis occur in two out of his three cases. Recamier and Michon have lost their cases from peritonitis.[2]

Boinet has had a considerable experience in tapping ovarian cysts and injecting with iodine from time to time, constantly leaving the canula *in situ;* and I derive the following, on this subject, from his work, already frequently quoted.

The only cysts adapted to this treatment, he asserts, are monocysts containing a dense, very albuminous, or oily fluid; as he would treat those containing a serous or purulent fluid by injections of iodine alone. Formerly the immediate objects of treatment were:

1. To produce adhesion of the abdominal walls to the cyst, around the site of the canula.

2. To promote the constant flow of the fluid of the cyst, and favor the application of the washings or the injections required during the treatment.

Several instruments have been invented to prevent the escape of fluid from the cyst into the peritoneal cavity. In

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[1] "Guy's Hospital Reports," 1869.

[2] Sir J. Y. Simpson's "Clinical Lectures on Diseases of Women," New York, 1872, p. 465.

1842, M. Rambaud presented one to the French Academy of Medicine of the following description: It consists, in addition to the canula of an ordinary trocar, of a second external canula, welded to the former at its distal extremity. At one-half to three-fourths of an inch from the common opening of the two canulæ, the outer one is divided, for a length of two and a half to three inches, into four equal branches, having joints at their middle and at both ends. The trocar, thus arranged, is plunged into the cyst, and the outer canula, being slid forward upon the inner one, opens like an umbrella within the cyst, and is then made to bring the latter into direct contact with the abdominal wall, where it is held by a movable disk, which slides down upon the surface of the abdomen, and is fixed there by a screw.[1] This instrument is kept in place a sufficient length of time to secure inflammation and adhesion of the two surfaces in contact.[2] M. Panas and M. Nélaton have also devised instruments acting on the same principle.

Boinet, however, prefers to all these instruments a simple gum-elastic bougie (like the one he uses for iodine-injections), introduced through the canula after the withdrawal of the trocar, as being more convenient for withdrawing the fluid, and practising the washings and the injections required. And, in using this, no preliminary steps are required for producing adhesion of the cyst to the abdominal walls, it being constantly left in the former.

The operation of tapping the cyst, washing it out, and injecting the tincture of iodine, is performed precisely as described on p. 211. The iodine, however, is to be left somewhat longer in the cyst (ten to fifteen minutes), and is then withdrawn, as before explained. The catheter is then closed by a well-fitted stopper, and kept in place by an appropriate bandage. The stopper is to be removed several times daily, in order to keep the cyst empty; and, if the tube becomes clogged up, warm water is to be forced through it by the syringe.

If the fluid in the cyst acquires an odor of decomposition after the operation, the cyst must be washed out daily with warm water, and the iodine-injection be more frequently repeated. If it does not, the cyst may be washed out once in three or four days, and the iodine be injected once in ten days.

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[1] A similar instrument has also been introduced by Dr. T. G. Thomas for tapping the cyst in ovariotomy.

[2] *Gazette Médicale*, 1842, p. 111.

The tube should be replaced by a new one in ten days; at the end of which time adhesions should have formed between the cyst-wall and that of the abdomen, and after which there is, of course, no fear of escape of the iodine into the abdominal cavity. As long as the tube is necessary, it must be changed once in eight to ten days, the size being gradually increased. After the removal of the catheter, the patient must not move in the least, till the other is introduced. The inner extremity of the tube should not be allowed always to rest upon the same point in the interior of the cyst.

When the fistulous passage and the adhesions are well established, the gum-elastic tube may be replaced by one of platina or of ivory, and the patient be allowed to walk about. This treatment will need to be continued for months, and sometimes for years. It is also scarcely if at all less dangerous than ovariotomy, and should therefore be reserved for cases in which for some reason ovariotomy is not to be thought of, or those in which ovariotomy has been attempted, but found impossible by reason of adhesions.[1]

But, if the method of tapping and keeping the canula *in situ* is to be resorted to, tapping *per vaginam* is to be preferred. Scanzoni is said to have cured eight cases out of fourteen in this way. Kiwisch commended this method very highly, and Dr. Schnetter, of this city, has extended Kiwisch's method to polycysts, as well as improved it. I discern no advantage in tapping *per rectum* in any circumstance; though Tavignot preferred that procedure in all cases in which the cyst can be opened from that canal.

Various instruments have been proposed for this method of treatment, at different times; and it has been tried by Neumann, Recamier, Arnolt, Waltz, Ogden, Noetig, Waltson, Bishop, Schwabe, Briquet, Michon, Huguier, and others. But Boinet asserts that it gave no better result than when the puncture was made—the canula being left *in situ*—through the abdominal walls.

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[1] See report of such a case by Dr. W. W. Green, *Boston Medical and Surgical Journal*, March 2, 1871, p. 140.

Dr. E. Noeggerath, of New York, has published[1] six cases thus treated by himself, with the following very satisfactory results: Five of the cases recovered. He also tabulates fifty-three operations of this kind, with the following results: Thirty-four, or 61.8 per cent., were successful; the disease returned in three cases; result remained undecided in four; and death occurred in fourteen cases, or $25\frac{8}{11}$ per cent. Seven of these deaths were caused by septicæmia and secondary peritonitis; one by typhoid fever; and one by an attack of peritonitis not caused by the operation itself.

But I allude to Dr. Noeggerath's article especially for the purpose of calling attention to the important improvement made by him in the operation under consideration. At first he used a long curved trocar and canula, withdrawing the former and evacuating the cyst, and then passing through the canula and into the cyst a long knife, with which he made a free incision into the cyst, as he withdrew the canula and the knife together. He then introduced a larger tube into the cyst, and retained it there till the cure was effected.

More recently, however, he has made the following very great improvement in this operation: He first makes a transverse incision about one inch long, behind the cervix uteri and through the roof of the vagina, up to the cyst. This coming into view, is then evacuated by a free incision; and finally the edges of the two incisions are stitched together by five or six silver sutures. The cyst is thus left freely and permanently open into the vagina. It is washed out daily for a time with antiseptic injections, until it finally contracts and ceases to afford any secretion. The cure is effected, in favorable cases, in four to six weeks. By this method opportunity is afforded of preventing any escape of fluid from the cyst, or any entrance of air, into the peritoneal cavity, as well as the absorption of putrescent fluid from the cyst. Up to December 15, 1871, Dr. Noeggerath had operated six times in this way with five successful results; five of the operations were for polycysts.

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[1] "On Ovariocentesis Vaginalis," *American Journal of Obstetrics*, May, 1869, p. 229.

I regard this operation, as improved and practised by Dr. Noeggerath, as being of the highest value in those cases of ovarian cysts to which, on account especially of adhesions, ovariotomy is not applicable. Many of the cases of unfinished ovariotomy, so called, may doubtless be cured in this way. And Dr. Noeggerath has shown that not merely simple cysts of a moderate size may be cured in this way, but also polycysts, and both kinds of cystoma ovarii, even of large size. In case of polycysts, however, only one cyst, as a general rule, should be opened at a time, and the lowest first. He also maintains that women reduced to a very low degree of health and strength may be safely subjected to this method of operating.

Dr. Noeggerath does not propose to treat dermoid cysts by the operation above described. I have, however, had under observation a case of dermoid cyst ruptured during parturition, and discharged *per vaginam*, which has since been kept open, and has at length been reduced, by astringent and antiseptic injections, to the size of a walnut. As a part of its inner surface is true skin, even caustics have not in my hands destroyed it, and therefore a slight discharge, containing at times a few hairs, still exists. Dr. Noeggerath's operation may therefore prove beneficial even in cases of dermoid cysts; and even fibro-cysts of the uterus, falling low in the pelvis, may also perhaps be obliterated in some cases in this way.

3. I here also speak, as a matter of history merely, of the method of treatment by *forming a permanent opening of the cyst into the cavity of the peritonæum.* This is sometimes effected by removing a portion of the cyst, and in others by merely making a puncture in the latter. If a common trocar is used, however, the puncture closes in a day or two, and therefore Dr. Simpson proposes one with four instead of three cutting edges.

This operation is suggested by the recoveries which sometimes follow a spontaneous rupture of an ovarian cyst, and the escape of its contents into the peritoneal cavity. But we are to remember that sometimes, also, fatal peritonitis occurs in consequence of such a rupture (p. 74), the effect depending mainly on the nature of the fluid contained in it. Of seventy cases of spontaneous rupture of a cyst, collected by Dr. Tilt, thirty died. So this operation is not seldom followed by a fatal result. If the fluid is found by a previous tapping to be clear and serous, a disastrous result is far less probable; if dense and highly albuminous, or containing fibrinous flakes, the operation should not be performed under any circumstances. It may be tried, if at all, in some cases of smaller monocystic tumors, though with no great prospect of success. Dr. Simpson has succeeded in one case,[1] and I think his method is best, viz.: Use a large quadrangular trocar, and make it sure that the puncture does not close, by pressing the accumulating fluid from the cyst into the peritoneal cavity from day to day, so long as there is a distinct accumulation.

I do not recommend this method in any case.

Recapitulation of Preceding Methods.—1. Simple tapping of ovarian cysts is merely a palliative measure. It is attended with some risk in case of monocysts and oligocysts (one fatal case in twenty-five to thirty), and should not be practised, except for diagnostic purposes, upon polycysts at all.

2. Of the curative methods only two can be recommended, and these only in rare cases, viz., tapping, with injections of iodine, and the same, also keeping the elastic canula permanently in the cyst; or, far better, the operation of Dr. Noeggerath.

3. In case of thin-walled, uncomplicated monocysts alone, containing a clear serous, citrine, or sanguineous, or a purulent fluid, iodine injections, commenced in the first stage and properly performed, promise a cure in ninety cases out of one hundred. The number of injections required may vary from one to even fifteen.

4. Iodine injections, with the canula retained permanently in the cyst, require to be continued for months or years; are scarcely less dangerous than ovariotomy; and should give way to Dr. Noeggerath's procedure. The latter may with advantage be resorted to, in those cases of monocysts and some polycysts also in which, for some reason, ovariotomy is not to be thought of, or in case ovariotomy has been found impracticable from the existence of adhesions.

5. For all ovarian cysts, therefore, except those described under 3 and 4, ovariotomy is the only remedy.

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[1] *Op. cit.*, p. 459.

OVARIAN TUMORS AND OVARIOTOMY.

PART II.

OVARIOTOMY (OÖPHORECTOMY)—ITS HISTORY, STATISTICS, INDICATIONS, PROGNOSIS, OPERATIVE METHODS, AND AFTER-TREATMENT.

LEEDS SCHOOL O MEDICINE

OVARIOTOMY.

CHAPTER I.

THE HISTORY AND PROGRESS OF OVARIOTOMY (OÖPHORECTOMY).

In tracing the history of this subject, I shall first give the opinions of the highest authorities, from the earliest times, respecting the extirpation of ovarian tumors, and the experience of the first ovariotomist, and then follow its progress in this country, England, France, Germany, and the other countries of Europe.

SECTION I.

EARLY OPINIONS RESPECTING OVARIOTOMY; AND THE EXPERIENCE OF DR. E. McDOWELL.

Ovariotomy[1]—or, to use a more distinctive term, Oöphorectomy—is the operation whose object and result is the removal of an ovarian tumor, and of an ovarian cyst, as has been shown, in more than ninety-nine per cent. of all the cases. In its life-prolonging results to woman, this operation greatly excels all other strictly surgical procedures. It was first performed by Dr. Ephraim McDowell, of Danville, Kentucky, in December, 1809. In order to place the claims of Dr. McDowell to priority, as an ovariotomist, beyond all possible question in the future, I shall examine the foundation upon which they rest.

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[1] The term ovariotomy was first proposed by Sir James Y. Simpson to Dr. Charles Clay, of Manchester, England, in 1844. It is a barbarous compound of Latin and Greek, and, besides, does not express the meaning intended. It means "cutting an ovary," or (Lat.) ovario-section; while the term used should signify "cutting out an ovary," or (Lat.) ovario-exsection. From all analogy, the terms should be derived from the Greek; which gives Oöphorotomy, (*'Ωόφορον*, ovary, and *τέμνω*, to cut), and Oöphorectomy (*'Ωόφορον*, and *εκτέμνω*, to cut out the ovary). Similar terms are already found in our science, as iridectomy, clitoridectomy, etc.

It is an historical fact that certain kings of Lydia caused the ovaries of women to be removed, using them sometimes in their service and sometimes for their pleasure. Andramystes is said by Athenæus[1] to have been the first who did this; and that he placed the women at service instead of eunuchs; while Gyges hoped by this operation to bestow upon them perpetual youth. Ancient authors, however, disagree as to the precise character of the operation. For, while Strabo and Diemerbroeck[2] assert that the ovaries were actually extirpated, Adolphus[3] states that the uterus was removed; and others still that only circumcision[4] (probably clitoridectomy) was performed. We are also told by Wierus, in his book "De præstigiis," quoted by Boerhaave,[5] De Graaf,[6] and others, that an Hungarian sow-gelder nearly two hundred years ago, being disgusted by the lewdness of his daughter, exercised his professional skill upon her also. But all this is not ovariotomy, as understood by all at the present day.

Percival Pott also removed both ovaries from a woman twenty-five years of age; and Lassus[7] saw a surgeon remove one by mistake, in case of a girl of eighteen. But neither operator had the slightest idea that he had to deal with the ovary when he commenced his operation; and the latter did not know he was operating on this organ until after he had removed it. Both cases had been mistaken for inguinal hernia. Deneux also reports that he removed almost the whole of one ovary. All three patients recovered, but neither of them was a case of ovariotomy. Mr. Pott's case has been so often alluded to that I insert it here:

AN OVARIAN HERNIA.[8]

A healthy woman, about twenty-three, was taken into St. Bartholomew's Hospital, on account of two small swellings, one in each groin, which, for some months, had been so painful that she could not do her work as a servant. The tumors were perfectly free from inflammation, were soft, unequal in their surface, very movable, and lay just on the outside of the tendinous opening in each of the oblique muscles, through which they seemed to have passed.

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[1] Δειπνοσοφιστῶν, lib. xii., cap. iii., fol. 515.

[2] "Anatomia corporis humani," lib. i., cap. xxiii.

[3] "Diss. de Morb. frequent. et grave," § 33.

[4] "Marc. Anton. Ulmus, apud Zacchiam."

[5] "Prælect. Acad in propr. instit.," vol. v., par. 2, § 669.

[6] "De Mul. organ. generat. tract. nov.," cap. xiii.

[7] Pathol. Chirurg., t. ii., p. 100.

[8] "Chirurgical Works of Percival Pott, F. R. S.," London, 1783, vol. iii., p. 329.

The woman was in full health, large-breasted, stout, and menstruated regularly, had no obstruction to the discharge *per anum*, nor any complaint but what arose from the uneasiness these tumors gave her, when she stooped or moved so as to press them.

She was the patient of Mr. Nourse. He let her blood and purged her, and took all possible pains to return the parts through the openings through which they had clearly passed out. He found all his attempts fruitless, as did Mr. Sainthill and myself; and, the woman being incapacitated from getting her bread, and desirous to submit to any thing for relief, it was agreed to remove them.

The skin and membrana adiposa being divided, a fine membranous bag came into view, in which was a body so exactly resembling a human ovarium that it was impossible to take it for any thing else; a ligature was made on it, close to the tendon, and it was cut off. The same operation was done on the other side, and the appearance, both at the time of operating, and in the examination of the parts removed, was exactly the same. She has enjoyed good health ever since, but is become thinner and more apparently muscular; her breasts, which were large, are gone; nor has she ever menstruated since the operation, which is now some years.

No less than four operators have, however, been represented by very high authority to have anticipated Dr. McDowell as an ovariotomist. These are Dr. Robert Houstoun, of Glasgow; Laumonier, surgeon-in-chief of the great hospital of Rouen; Prof. Dzondi, of Halle; and Galenzowski, of Wilna.[1]

1. Reviewing these cases in chronological order, I find that Dr. Houstoun did not perform ovariotomy. He simply made an incision four inches long through the abdominal walls and into the ovarian cyst (ovario-section), and evacuated its contents. He then closed the incision, except at its lower end, where he left a small tent inserted. The patient recovered, and died thirteen years afterward. This operation was in 1701. The report of his case[2] has been reproduced by our most distinguished ovariotomist, Dr. W. L. Atlee, in the *American*

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[1] Table, by Dr. W. L. Atlee, of all known operations of ovariotomy, from 1701 to 1851. *American Journal of Medical Sciences*, 1851, vol. iv., p. 286.

[2] "Philosophical Transactions," vol. xxxiii., p. 8, London, 1726.

Journal of Medical Sciences, for April, 1849, p. 534, and is as follows:

A Dropsy in the Left Ovary of a Woman aged Fifty-eight Years, cured by a Large Incision made in the Side of the Abdomen. By Dr. Robert Houstoun.

In August, 1701, Margaret Miller, living not far from Glasgow, informed me that her midwife in her last lying-in, at forty-five years old, having violently pulled away the burthen, she was so very sensibly affected by a pain which then seized her in the left side, between the umbilicus and groin, that she scarce ever had been free from it after; that it had troubled her more or less during thirteen years together; that for two years past she had been extremely uneasy, her belly grew very large, and a difficulty of breathing increased continually upon her, insomuch that for the last six months she had breathed with the utmost difficulty. That, in all that space of time, she had scarce ate so much as would nourish a sucking-child; and, that, for three months together, she had now been forced to lie continually upon her back, not daring to move at all, to one side or other.

This tumor was grown to so monstrous a bulk, that it engrossed the whole left side from the umbilicus to the pubes, and stretched the abdominal muscles to so unequal a degree, that I do not remember to have ever seen the like in the whole course of my practice. It drew toward a point. Her being so long confined to lie continually on her back, having grievously excoriated her, added much to her sufferings, which, with want of rest and appetite, had greatly wasted her.

I told her that, in order effectually to relieve her, I must lay open a great part of her belly, and remove the cause of all that swelling. She seemed not frightened, but heard me without disorder, and pressed me to the operation.

I drew (I must confess) almost all my confidence from her unexpected resolution, so that without loss of time I prepared what the place would allow, and, with an imposthume lancet, laid open about an inch; but finding nothing issue, enlarged it two inches, and even then nothing came forth but a little thin, yellowish serum, so I ventured to lay it open two inches more. I was not a little startled, after so large an aperture, to find it stopped only by a glutinous substance. All my difficulty was to remove it; I tried my probe, I endeavored with my fingers, but all was in vain; it was so slippery that it eluded every touch, and the strongest hold I could take.

I wanted, in this place, almost every necessary, but bethought myself of a very odd instrument, yet as good as the best, because it answered the end proposed. I took a strong fir-splinter, wrapped some loose lint about the end of it, and thrust it into the wound, and, by turning and winding it, I drew out about two yards in length of a substance thicker than any

> jelly, or rather like glue that is fresh made and hung out to dry; the breadth of it was above ten inches; this was followed by nine full quarts of such matter as I have met with in steatomatous and atheromatous tumors, with several hydatids of various sizes, containing a yellowish serum, the least of them bigger than an orange, with several large pieces of membranes, which seemed to be parts of the distended ovary. Then I squeezed out all I could, and stitched up the wound in three places, almost equidistant. I was obliged to make use of Lucatella's balsam, which was made by her lady for the use of the poor; with this balsam I covered a pledget, the whole length of the wound, and over that laid several compresses, dipped in warm French brandy, and because I judged that the parts might have lost their spring by so vast and so long a distention, I dipped in the same brandy a large napkin four times folded, and applied it over all the dressings, and with a couple of strong towels, which were also dipped, I swathed her round the body, and then gave her about four ounces of the following mixture: ℞. Aq. menthæ, f℔j; aq. cinnamomi, f℔j; syr. diacodii, ℥vj. M.
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> The cinnamon-water was drawn off from canary and the best cinnamon; indeed it was the finest and most fragrant cinnamon-water I ever tasted; of this mixture, I ordered her two or three spoonfuls four times a day.
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> Next morning I found her in a breathing sweat, and she informed me, with great tokens of joy, that she had not slept so much nor found herself so well refreshed at any time for three months past. I carefully attended her once every day, and as constantly dressed her wound in the same manner as above, for about eight days together; I kept in the lower part of the wound a small tent, which discharged some serosities at every dressing, for four or five days. But business calling me elsewhere, I left her, having first instructed her two daughters how to dress her wound, and told them what diet I thought was most proper. Her chief food was strong broth made of an old cock, in each porringer of which was one spoonful of cinnamon-water; this was repeated four times a day, and gave her new life and spirits. After three weeks' absence, I called at her house, and finding it shut up was a little surprised, but had not gone far before I was much more surprised, when I found her sitting wrapped up in blankets, giving direction to some laborers who were cutting down her corn. She mended apace, to the admiration of everybody thereabouts, recovered surprisingly, and lived in perfect health from that time till October, 1714, when she died in ten days' sickness.

Dr. Houstoun's pathogenesis of the ovarian cyst should also be added:

> That this tumor, or rather dropsy of the ovarium, proceeded from the midwife's rashness in pulling away the placenta, not knowing how to separate it from the uterus skilfully, seems to me plain from what the

woman herself told me, and what fell out afterward. The placenta adhering fast to the uterus, required more art to bring it away than she was mistress of, which probably induced her to use violence; by which she forced down the fundus uteri, and so overstrained the ligaments and all that is appended to them, especially the ligamentum latum of the left side, and its ovarium, which may be reasonably allowed to have been hurt in the relaxation with the rest. Hence the elasticity of those parts was not only impaired, but the small lymphatics ruptured, so that the extravasated lympha rushing out, thickened, and not being able to recirculate, dilated the injured ovarium, and thus increased the tumor, and the parts being already excessively distended, and being no longer able to resist the new influx of fresh secretions, ruptured also, and by degrees augmented to that huge and enormous bulk.

2. Both Boinet and Kœberlé assert that Laumonier's was not a case of ovariotomy; and surely they are competent witnesses, both as the countrymen of Laumonier and as ovariotomists. Nevertheless, Boinet places it at the head of his list of ovariotomies in France. Kœberlé terms it a case of dropsy of the Fallopian tube complicated with ovaritis.[1]

The contents of the tube were, however, fetid and purulent, and the ovary of the same (the left) side as large as an egg. Laumonier opened the dilated tube by an incision through the abdominal walls, and evacuated the decomposing fluid; and then without any premeditation, and without any necessity, as Boinet well remarks, he removed the ovary, supposing it might be in a scirrhous condition. The patient recovered. She had had hectic fever for six or seven weeks after confinement, when the operation was performed. Boinet gives (p. 296) the following abstract of Laumonier's report of his case in the "Histoire de la Société Royale de Médecine," 1782, tome v.:

Une femme de 21 ans, relevant de couche, était affectée depuis six ou sept semaines d'une fièvre lente, d'une diarrhée colliquative et d'un écoulement vaginal abondant et fétide; elle présentait dans la région hypogastrique, qui était tendue et douloureuse, une tumeur dure, dont la pression faisait couler une humeur puriforme par le canal vaginal. On considéra l'affection comme résultant d'un dépôt laiteux dans l'ovaire et dans la trompe, qu'on se décida à ouvrir. Laumonier fit une incision de 12 centimètres, parallèle au pli de l'aine, et mit à découvert une tumeur bleuâtre, adhérente par sa partie inférieure, surmontée par une autre tumeur de la grosseur d'un œuf, formée par l'ovaire. La pression exercée sur cette tumeur fluctuante, qui était formée par la trompe, fit sortir une petite quantité de pus par le vagin; il fendit cette poche fluctuante, depuis la petite tumeur formée par l'ovaire jusqu'à l'endroit où la trompe s'unit à l'angle de la matrice, et donna issue à une pinte de liquide purulent, noirâtre, extraordinairement infect; l'ovaire, ayant été considéré comme étant devenu squirrheux, fut détaché de la trompe, ce qui donna lieu à une hémorrhagie insignifiante.

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[1] "De l'Ovariotomie," 1865, p. 11.

La cavité de la trompe fut ensuite remplie avec de la charpie, imbibée d'un mélange de miel et de jaune d'œuf.

L'appareil du pansement ayant été levé au troisième jour seulement, il s'échappa de la plaie 5 à 6 onces de matière sanieuse et infecte. Comme les intestins étaient enflammés et adhérents dans toute la circonférence de la tumeur avec la paroi abdominale, Laumonier voulut les décoller, pour éviter, dit il, des tiraillements douloureux, que ces sortes d'adhérences occasionnent souvent après la guérison des maladies qui leur ont donné lieu; mais heureusement, il éprouva une trop grande résistance, et la malade des douleurs trop vives, et il ne put exécuter son entreprise, qui aurait été infailliblement suivie d'une péritonite mortelle.

Vers le seizième jour, la cavité de la trompe était réduite à un volume à peu près égal à celui d'un œuf. Au bout d'un mois, la cicatrisation de la plaie était complète.

3. Upon Dzondi's case, reported by him in a work published at Halle, in 1816,[1] I have four remarks to offer:

1. The cyst removed by him was not an ovarian cyst.

2. The patient was not a female; and therefore, not a candidate for ovariotomy, under any circumstances.

3. He was a boy, twelve years old, named Christopher Shultz.

4. The operation of Prof. Dzondi was performed six or seven years after Dr. McDowell's first operation of ovariotomy.

The boy had a cystic tumor in the pelvis, as large as his head. Prof. Dzondi incised it, introduced tents, and removed mortified portions of it. He speaks of other cases relieved in the same way, and suggests that this treatment might prove equally successful in cases of ovarian cysts, provided the cyst were superficially situated, and were not affected by ulceration or by scirrhus. He also, in 1821, reported a case[2] of ovarian cyst, which, after making an incision through the abdominal walls, he decided not to remove.

4. Prof. von Galenzowski's case was really one of ovarian

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[1] "Beitrage zur Vervollkumming der Heilkunde."

[2] "Æsculap., Zeitschrift der Vervollk. der Heilk.," 1821, ii., 1.

cyst. It was, however, firmly and universally adherent. He incised the cyst, tore out its contents with his fingers, and then stitched it to the external wound.. The patient was discharged on the seventieth day, having only a small fistula in the hypogastric region.[1] I must also add that this operation was performed on the 30th of March, 1827, between seventeen and eighteen years after Dr. McDowell's first operation of ovariotomy. He reported the case, in Latin, in Gräfe and Walther's *Journal* for 1829, vol. xii., No. 4; and the operation was performed as follows:

> The patient being laid on a table, and properly secured, an incision five inches long was made through the linea alba, commencing from above the umbilicus. The peritonæum being divided by this incision, a portion of intestine and omentum protruded, and the tumor presented itself, being the right ovarium greatly enlarged. Its surface was white, hard, and irregular, here and there covered by a cartilagino-tendinous coat, varying in thickness. It was found that the tumor extended over to the left iliac region, adhering in its whole extent to the posterior parietes of the abdomen, and containing evidently a fluid. Its total extirpation was found to be impracticable. A large incision was therefore made into its cavity, according to the plan of Le Dran; very little fluid escaped, and, on passing the finger into the sac, it was found to be composed of innumerable cells, which, being destroyed, about three pints of a thick, yellowish matter like honey were evacuated. A ligature was now passed through one side of the sac, and brought out at the external wound, with a view of preventing its separation from the latter, and the escape of its contents into the abdomen. The intestines being carefully replaced, the wound was washed and closed by sutures and adhesive plaster. A pledget of lint, wet with oil, was introduced into the lower angle of the incision, extending into the cavity of the sac; over the whole a light dressing was applied, and the patient placed in bed.

Portions of the cyst were thrown off on the thirty-second, the fifty-second, and the sixty-second days. On the seventieth she was discharged, with the advice still to keep the opening free by a tent of lint so long as any matter continued to be secreted.

I know of no other competitor with Dr. McDowell for the distinction of having inaugurated the operation of ovariotomy, who should be noticed here.[1] Thus it appears that Dr. McDowell first deliberately attempted to remove an ovarian tumor, and succeeded; and this is ovariotomy, or oöphorectomy. The question who first *suggested* the idea of removing an ovarian cyst is not so easily answered. Indeed, the idea could scarcely fail to occur to any bold and experienced surgeon who had witnessed the *post-mortem* examination of a case without adhesions, or attachment to any part or organ except by a long and slender pedicle. It is, however, very certain that those who first suggested this operation did so for the sake of condemning instead of recommending it.

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[1] See a translation of Galenzowski's paper in the *North American Medical and Surgical Journal*, vol. ix., 1830. Also "Dictionnaire de Médecine," tome xxii., p. 592, Paris, 1840, and *London Medical Gazette*, 1844–'45, p. 86, where it is tabulated merely.

It has been stated that F. Plater, Professor in the University of Basle, first suggested ovariotomy about the year 1680. Theodor Schorkopff published, in thirty theses,[2] the ideas upon ovarian tumors entertained at that time (1685), and remarks that "the extirpation of the ovary itself would more certainly cure, if it did not appear so cruel and so dangerous."

About the year 1720 more attention seems to have been paid to this subject. Peyer Imhoff reports a case, and refers to others;[3] and Ehrenfried Schlencker (1722), admitting with all physicians that ovarian dropsy is incurable, on the whole thinks extirpation of the ovary is inadmissible, but leaves the solution of the question to the prudence and the sagacity of the masters of the art.[4] Nicolaus Willius[5] (1731) rejects ovariotomy, and, first of all, proposes to tap the cyst and retain the canula for fourteen days; warm decoctions to be injected into the cyst, and a bandage to be applied to the abdomen. Peyer Ulric decides (1751), after raising the question of extirpation,[6] that a merely palliative treatment should be adopted.

Tozzetti, of Florence, in 1752, speaks quite timidly of the operation of extirpation of the diseased ovary, and doubts if one should think seriously of it. Subsequently, Theden, De Haen, and Morgagni, speak of extirpation, but only to object to the operation, though Theden described a method of performing it. De Haen describes it as an operation it would not do to talk about, lest some reckless surgeon should attempt to perform it.

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[1] The *Gazette Hebdomadaire*, 1866, p. 436, contains a statement that Dr. McDowell obtained the idea of ovariotomy from a hunter, named King, who had successfully operated upon a woman left to die by Dr. McDowell. This story has never been heard of in this country.

[2] "Dissert. med. inaugural. de hydrope ovarii," February 13, 1685.

[3] "Ovarium hydropsicum in virgine repertum," Basiliæ, 1781.

[4] "De singulare ovarii sinistri morbo," Leid., October 30, 1722.

[5] "Specim. med. sistens stupendum abdominis tumorem," Basiliæ, 1731, p. 35, Thesis 16.

[6] "Acta Helvetica, Phys. Mathem. Botan. Med.," tomus i., in appendice Thesis, 32, fol. 38, Basiliæ, 1751.

Dr. Wm. Hunter, who has been represented as first proposing ovariotomy, discouraged it, in speaking of the treatment of ovarian tumors as follows: "The trocar is almost the only palliative. It has been proposed, indeed, by modern surgeons, deservedly of the first reputation, to attempt a radical cure by incision and suppuration, and by the excision of the cyst. I am of opinion that excision can hardly be attempted, and that incision and suppuration will be found by experience to be an operation that cannot be recommended but under very particular circumstances." He adds, however, that "if we could beforehand know that the circumstances would admit of such treatment, the incision should admit only two or three fingers, and the cyst be tapped and drawn out, that the surgeon may cut the pedicle without introducing his hand."[1]

Van Swieten advised, in 1770, to resort to it if the disease were recent, and the tumor were not adherent.[2]

In France, Delaporte was the first to recommend the operation of the extirpation of the diseased ovary, in 1774;[3] and this was also defended by the celebrated surgeon Morand, secretary of the Royal Academy of Surgery of Paris. "Modern surgery," said he, "is capable of great things; too many methods of cure cannot be opened up to it." M. Hèvin, however, in a very learned memoir read before that body, opposed the views of Morand so effectually that the operation was never again seriously proposed in France till 1798, when Chambon closed his remarks upon this subject, after specifying the circumstances in which, and the kinds of tumors upon which, this operation should be performed, in the following language: "I am persuaded that a time will come when this operation will be extended to more numerous cases than I have proposed, and that it will not be found difficult to execute."[1]

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[1] "Medical Observations and Inquiries," vol. ii., p. 45, 1762.

[2] "Comment.," tom. iv., p. 1223.

[3] "Mémoires de l'Académie de Chirurgie," 1774, tome iv., p. 96.

In 1808, a thesis was read by Sam. Hartmann d'Escher at Montpellier, containing the following description from Thunin, of the operation:[2] "Make an incision along the outer border of the rectus muscle, detach with the fingers, or the bistoury even, the adhesions which exist, draw out and excise the tumor after having tied the pedicle, and let the ligature come through one of the angles of the wound, whose edges are to be brought together and kept coaptated by lateral compresses or a bandage around the body." From this time not an encouraging word has ovariotomy received from any surgeon in France for more than fifty years, or up to the year 1861, as will be seen.

In England the first suggestion decidedly in favor of ovariotomy is found in John Hunter's works, who said, in 1786,[3] that, "if taken in their incipient stage, 'hydatids of the ovary' might be taken out, as they generally render life disagreeable for a year or two, and kill in the end. There is no reason why women should not bear spaying as well as other animals."

In Scotland the first voice in favor of extirpation of diseased ovaria was that of Mr. John Bell, a teacher of anatomy and surgery at Edinburgh, about and after the year 1790; and from his suggestion doubtless the first operation of ovariotomy was performed by Dr. McDowell in 1809. His recommendation of the operation, however, had no influence in his own country, and not till 1825 was the operation there first attempted by Mr. Lizars, Professor of Anatomy and Physiology, in the University of Edinburgh.

Dr. McDowell was a student of medicine at Edinburgh during the sessions of 1793 and 1794,[4] and in the last year he was also a private pupil of John Bell, and heard him eloquently defend the operation for the extirpation of the ovary in ovarian dropsy, as he was accustomed to do. He devoted himself especially to anatomy and surgery while at Edinburgh, and, returning home, commenced practice in 1795. Cherishing the idea that he would remove an ovarian tumor whenever a suitable case presented itself, he had been in practice fourteen years, and had already acquired a high reputation as a surgeon throughout the then Southwest, and especially in the operation of lithotomy, and the management of hernia, before the opportunity presented itself in December, 1809, of carrying his intention into practice. His operation was successful, but, having a great aversion to writing, though always a diligent student of his profession, he delayed reporting it till he had performed two other operations.

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[1] "Maladies des femmes. Maladies chroniques à la cessation des règles, Paris, 1798, chap. xxxix.

[2] "Considérations medico-chirurgicales sur l'hydropisie enkystée des ovaires." Thèse de Montpellier, 1807.

[3] "Complete Works," vol. i., p. 655, Paris, 1839.

[4] Dr. McDowell was born in Virginia, in November, 1771, and was then twenty-three years of age.

But in 1818 he prepared a brief report of his first three cases, sending it to Philadelphia for publication, and a copy of it to his former preceptor, John Bell. The latter fell into the hands of Mr. Lizars, who "had the charge of Mr. Bell's patients and professional correspondence" while Mr. Bell was travelling on the Continent for his health. For some reason it was never sent to Mr. Bell, who never returned to Scotland again, though he did not die till April, 1820. I shall return again to the history of this copy. The original report appeared in the *Eclectic Repertory and Analytical Review*,[1] seven years after the first operation, and is as follows:

THREE CASES OF EXTIRPATION OF DISEASED OVARIA.

BY EPHRAIM MCDOWELL, M. D., OF DANVILLE, KY.

CASE I.—In December, 1809, I was called to see a Mrs. Crawford, who had for several months thought herself pregnant. She was affected with pain similar to labor-pains, from which she could find no relief. So strong was the presumption of her being in the last stage of pregnancy, that two physicians, who were consulted on her case, requested my aid in delivering her. The abdomen was considerably enlarged, and had the appearance of pregnancy, though the inclination of the tumor was to one side, admitting of an easy removal to the other. Upon examination, *per vaginam*, I found nothing in the uterus; which induced the conclusion that it must be an enlarged ovarium. Having never seen so large a substance extracted, nor heard of an attempt, or success attending any operation such as this required, I gave to the unhappy woman information of her dangerous situation. She appeared willing to undergo an experiment, which I promised to perform if she would come to Danville (the town where I live), a distance of sixty miles from her place of residence. This appeared almost impracticable by any, even the most favorable, conveyance, though she performed the journey in a few days on horseback. With the assistance of my nephew and colleague, James McDowell, M. D., I commenced the operation, which was concluded as follows: Having placed her on a table of the ordinary height, on her back, and removed all her dressing which might in any way impede the operation, I made an incision about three inches from the musculus rectus abdominis, on the left side, continuing the same nine inches in length, parallel with the fibres of the above-named muscle, extending into the cavity of the abdomen, the parietes of which were a good deal contused, which we ascribed to the resting of the tumor on the horn of the saddle during her journey. The tumor then appeared full in view, but was so large that we could not take it away entire. We put a strong ligature around the Fallopian tube near to the uterus; we then cut open the tumor, which was the ovarium and fimbrious part of the Fallopian tube very much enlarged. We took out fifteen pounds of a dirty, gelatinous-looking substance; after which we cut through the Fallopian tube and extracted the sac, which weighed seven pounds and a half. As soon as the external opening was made, the intestines rushed out upon the table, and so completely was the abdomen filled by the tumor, that they could not be replaced during the operation, which was terminated in about twenty-five minutes. We then turned her upon her left side so as to permit the blood to escape, after which we closed the external opening with the interrupted suture, leaving out, at the lower end of the incision, the ligature which surrounded the Fallopian tube. Between every two stitches we put a strip of adhesive plaster, which, by keeping the parts in contact, hastened the healing of the incision. We then applied the usual dressing, put her to bed, and prescribed a strict observance of the antiphlogistic regimen. In five days I visited her, and much to my astonishment found her engaged in making up her bed. I gave her particular caution for the future, and in twenty-five days she returned home as she came, in good health, which she continues to enjoy.[1]

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[1] For October, 1816.

Case II.—Since the above case,[2] I was called to a negro woman, who had a hard and very painful tumor in the abdomen. I gave her mercury for three or four months, with some abatement of pain, but she was still unable to perform her usual duties. As the tumor was fixed and immovable, I did not advise an operation, though, from the earnest solicitation of her master, and her own distressful condition, I agreed to the experiment. I had her placed upon a table, laid her side open as in the above case, put my hand in, found the ovarium very much enlarged, painful to the touch, and firmly adhering to the vesica urinaria and fundus uteri. To extract, I thought, would be instantly fatal; but, by way of experiment, I plunged the scalpel into the diseased part. Such gelatinous substance as in the above case, with a profusion of blood, rushed to the external opening, and I conveyed it off by placing my hand under the tumor, and suffering the discharge to take place over it. Notwithstanding my great care, a quart or more of blood escaped into the abdomen. After the hæmorrhage ceased, I took out as cleanly as possible the blood, in which the bowels were completely enveloped. Though I considered the case as nearly hopeless, I advised the same dressings and the same regimen as in the above case. She has entirely recovered from all pain, and pursues her ordinary occupations.

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[1] Mrs. Crawford died March 30, 1841, in the seventy-ninth year of her age. She was forty-seven at the time of the operation, her youngest child then being six years old.

[2] In 1813, since, as Dr. McDowell remarks in the report of his last two cases, this operation was performed six years before, i. e., before September 19, 1819.

Case III.—In May, 1816, a negro woman was brought to me from a distance. I found the ovarium much enlarged, and, as it could be easily moved from side to side, I advised the extraction of it. As it adhered to the left side, I changed my place of opening to the linea alba. I began the incision in company with my partner and colleague, Dr. William Coffer, an inch below the umbilicus, and extended it to within an inch of the os pubis. I then put a ligature around the Fallopian tube and endeavored to turn out the tumor, but could not. I then cut to the right of the umbilicus and above it two inches, turned out a scirrhous ovarium (weighing six pounds), and cut it off close to the ligature put round the Fallopian tube. I then closed the external opening, as in former cases, and, she complaining of cold and chilliness, I put her to bed prior to dressing her—then gave her a wineglassful of cherry-bounce and thirty drops of laudanum, which soon restoring her warmth, she was dressed as usual. She was well in two weeks, though the ligature could not be released for five weeks, at the end of which time the cord was taken away, and she now, without complaint, officiates in the laborious occupation of cook to a large family.

The operation of ovariotomy having thus been brought fairly before the profession by its originator,[1] I will briefly pursue its history in this country, and in those of Europe, in which it has been adopted.

SECTION II.

OVARIOTOMY IN THE UNITED STATES.

1. It would contravene all experience of the past respecting the inauguration of the great operations of our art, if the ori-

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[1] For a full account of the life and character of Dr. E. McDowell, reference is made to an article by the author of this work in the *New York Medical Gazette*, June 3, 1871, and to a biography of Dr. McDowell, in the "Lives of Eminent American Physicians and Surgeons of the Nineteenth Century," Philadelphia, 1861.

ginator of so decided an advance as ovariotomy should escape opposition and obloquy; and Dr. McDowell also met with his share, both at home and abroad. The brevity and incompleteness of his reports also exposed him to criticism, not always fair, on their account. Two or three instances will be here adduced:

Dr. Ezra Michener, of Philadelphia, in an article in the journal[1] containing Dr. McDowell's reports, after regretting that cases "as novel as interesting should come before the public in such a manner as to frustrate the intention of becoming useful," and expressing the hope that they really are "correctly stated," and sarcastically quoting what is said in the report of the first case respecting the effects of the horn of the saddle, and of the patient being engaged in making her bed on the fifth day, closes thus:

> The utter impossibility of our being able to ascertain with certainty the real nature of those internal diseases, the delusive nature of all their indications, and the necessary danger of an operation under the most favorable circumstances, will be likely to prove an insurmountable barrier to the use of the knife in their removal, as few persons will be likely to venture their reputation on such uncertain data.

Dr. McDowell reported two cases more of ovariotomy nearly two years after these strictures appeared,[2] and incidentally alluded to them in connection with the report. In respect to the effects of the saddle, he explains that the patient was a woman of low stature, and the tumor, weighing more than twenty pounds, extended to the right side about as much as to the left, and had become so pendulous as to reach almost to her knees. He did not explain the other quotation from his report by Dr. Michener; but it is proved that the patient was operated upon and nursed at Dr. McDowell's own house, where she was, of course, visited daily by Dr. McDowell and his nephew and partner at that time, Dr. James McDowell. He, however, replies at some length to the remarks of Dr. Henderson, who had, in another number of the *Repertory*[3] expressed the wish that the cases "had been reported in a more particular detail."

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[1] *Eclectic Repertory*, January, 1818, vol. viii., No. xxix., p. 114.

[2] Ibid., October, 1819, vol. ix., No. xxxvi., p. 546.

[3] Ibid., October, 1818, vol. viii., No. xxxii., pp. 548, 558.

I quote the passage from Dr. McDowell's reply, as profitable reading for some operators at the present day:

> I thought my statement sufficiently explicit to warrant any surgeon's performing the operation when necessary, without hazarding the odium of making an experiment, and I think my description of the mode of operating, and of the anatomy of the parts concerned, clear enough to enable any good anatomist, possessing the judgment requisite for a surgeon, to operate with safety. I hope no operator of any other description may ever attempt it. It is my most ardent wish that this operation may remain, to the mechanical surgeon, forever incomprehensible. Such have been the bane of the science, intruding themselves into the ranks of the profession, with no other qualification, but boldness in undertaking, ignorance of their responsibility, and indifference to the lives of their patients; proceeding according to the special dictate of some author as mechanical as themselves, they cut and tear with fearless indifference, utterly incapable of exercising any judgment of their own, in cases of emergency; and sometimes without possessing the slightest knowledge of the anatomy of the parts concerned.
>
> The preposterous and impious attempts of such pretenders can seldom fail to prove destructive to the patients, and disgraceful to the science. It is by such, this noble science has been degraded, in the minds of many, to the rank of an art.

The preceding quotation shows the broad and elevated views of Dr. McDowell as a surgeon, and the advanced opinions he had already formed respecting the operation he had inaugurated.

An attempt was subsequently made to deprive Dr. E. McDowell of the credit of his first operation, by ascribing it to his nephew and partner, as we have seen—Dr. James McDowell. This was triumphantly refuted by a card published by Dr. E. McDowell, in 1826, addressed to the physicians and surgeons of the West. It had simply been arranged beforehand that his partner should make the first incision under his direction, and that he should then take the knife and finish the operation, which was done.[1]

Of Dr. McDowell's cases Nos. IV. and V., the former was successful. The latter, a case of dermoid cyst, was not so. Both patients were negresses. Dr. Gross gives the particulars of three other cases operated on by Dr. McDowell;[2] and Dr. Alban G. Smith, who was also a practitioner at Danville, and assisted Dr. McDowell, states that the latter performed ovariotomy thirteen times in all, and that eight at least of these operations were successful.

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[1] Gross on "Kentucky Surgery," pp. 38, 39.

[2] Ibid., pp. 10–16.

Dr. McDowell died June 25, 1830, in the fifty-ninth year of his age.

2. The next ovariotomist in this country, after Dr. McDowell, was Dr. Nathan Smith, then Professor of Surgery in Yale College, New Haven, Connecticut. This operation was also as truly original as the first of Dr. McDowell, Dr. Smith being at the time entirely unaware that Dr. McDowell had operated at all.[1] It was performed at Norwich, Vermont, on the 5th of July, 1821, and was reported in the *American Medical Recorder* for June, 1822,[2] and in the *Edinburgh Medical and Surgical Journal* for October, 1822.[3] It was a case of thin-walled monocyst, which had burst three times; twice during pregnancy, and once from a fall. The patient was a Mrs. Strobridge, aged thirty-three years.

Dr. Smith did not open the abdomen till the blood ceased to flow from the incision. The omentum being adherent, it was detached, and two arteries in it tied with leather ligatures (narrow strips cut from a kid-glove). Two arteries were also tied in the pedicle. The latter was dropped back into the peritoneal cavity, and the incision (three inches long) closed. The cyst weighed two to four ounces, and contained eight pints of fluid. No unfavorable symptoms occurred; and, at the end of three weeks, the patient sat up and walked. Dr. H. Hatch, still living in New York, assisted Dr. Smith at the operation, and confirms the statements just made. Dr. Smith desisted from a second attempt at ovariotomy on account of adhesions. The patient recovered from his operation.[4]

3. The third successful ovariotomist in this country was Dr. Alban G. Smith, of Danville, Kentucky, whom I have already mentioned in connection with the operations of Dr. E. McDowell. His operation was performed May 23, 1823, and was reported in the *North American Medical and Surgical Journal*, January, 1826.[5] Patient, a negress, thirty years old,

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[1] Stated on the authority of his son, Prof. N. R. Smith, of Baltimore.

[2] Philadelphia, vol. v., p. 124.

[3] Vol. xviii., p. 533.

[4] N. Smith, "Medical and Surgical Memoirs," p. 231.

[5] Vol. i., p. 30.

and had had two children. He had also operated unsuccessfully in 1818.

A ligature was put round the pedicle, and the latter cut off at least three-quarters of an inch from it, the ends being left out of the lower end of the incision. Patient was turned upon the abdomen to let the blood flow out of the peritoneal cavity, and great care was taken to include the peritonæum in the sutures. Ligatures came away on the twenty-fifth day. Recovery. His administration of the decoction of senna the night after the operation, producing a few evacuations the next day, and several the day after, would not be applauded at the present time.

The fourth who attempted ovariotomy in this country was Dr. Joseph A. Gallup, Professor in the Medical College at Woodstock, Vermont. This operation was performed June 12, 1824, and is reported in the *New England Journal of Medicine and Surgery* (vol. xiv., p. 358), October, 1825. The tumor was a monocyst, with a strong, thick, dark wall, of mahogany-color, or like a gum-elastic bottle. It was free at its upper two-thirds, and one-half inch thick, and adherent at the lowest third. The upper two-thirds were cut off, and the rest of the cyst left, it being one inch thick one-half the way round, and three-fourths of an inch the other half. The contents were so viscid as only to be obtained through a large incision, and the part left did not readily collapse. It held about a pint, and was adherent over a surface four and a half inches in diameter, to the "solid parts contiguous to the os innominatum." (It was probably not an ovarian cyst.—P.) The cyst bled very freely, especially at the thickest part, when cut. Interrupted sutures were passed through the two edges of the cut surfaces, about one inch apart, as fast as it was cut, and the threads left hanging out came away in four or five days. Death on the sixth day, with tetanic symptoms. The raw edges of the cyst having united, a closed sac was thus formed, holding about a pint of purulent matter.

In April, 1827, Dr. Trowbridge, of New York, attempted ovariotomy, but desisted on account of adhesions. The patient had recovered from the operation in fifteen days.[1]

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[1] Dr. Lyman's Report, case 266.

In July, 1828, Dr. R. D. Mussey, Professor of Surgery in the Medical Department of Dartmouth College, attempted ovariotomy at Ryegate, Vermont. He was prevented by adhesions from completing the operation, and merely incised the cyst, removing four or five pints of fluid, and introduced tents. The patient was cured in a few weeks, and had her last and fourteenth child one year afterward, at the age of forty-one. No vestige of the tumor then remained.[1]

Dr. J. Billinger, of Charleston, South Carolina, also attempted ovariotomy in 1828. The patient recovered from the incision.[2]

4. The fourth who actually performed ovariotomy in the United States, was Dr. David L. Rogers, still residing in New York, where his operation was performed September 24, 1829.[3] The vessels in the pedicle were large and numerous, one the size of a goose-quill. The operation lasted two hours. It is inferred that the pedicle must have been very short. The vessels in it were tied separately, the ligatures cut close to the knots, and the whole incision closed at once. In two weeks the patient sat up, and walked about the room.

Dr. J. C. Warren, Professor of Surgery, Boston, attempted ovariotomy in November, 1830. The tumor was solid and weighed twenty-five pounds, and was (incorrectly?) termed a scirrhous tumor. There were extensive adhesions. The ligature, though double, slipped off the pedicle almost at once, and while attempting to tie the vessels, the patient lost much blood, "and in a short time sunk."[4]

In December, 1835, Dr. J. Billinger[5] successfully performed the operation of ovariotomy, tying two arteries in the pedicle with animal ligatures as did Dr. N. Smith, and closing the incision. It was a case of ovarian fibroma as large as the fist, complicated with hydrometra. From that time there was no case of ovariotomy in this country until the year 1843, when Dr. A. Dunlap[6] and Dr. J. L. Atlee had their first cases, the former an unsuccessful one.

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[1] *American Journal of Medical Sciences*, 1837, vol. xxi., p. 380.

[2] Lyman's Report, case 146.

[3] *New York Medical and Physical Journal*, 1830, vol. ii., p. 285.

[4] "Warren on Tumors," p. 590.

[5] *Southern Journal of Medicine and Pharmacy*, May, 1847, pp. 241–243.

[6] *Ohio Medical and Surgical Journal*, 1859, vol. xii., No. 2.

Dr. J. L. Atlee, of Lancaster, Pennsylvania, successfully removed both ovaries on the 29th of June, 1843.[1] He passed a double silk ligature through the middle of the pedicle, and then tied one-half of the latter with each half of the ligature, and brought its ends out at the lower extremity of the incision. This was the first operation of double ovariotomy ever performed.

Dr. W. L. Atlee, the most distinguished of American ovariotomists, had his first operation, an unsuccessful one, on the 23d of March, 1844;[2] and Dr. J. D. Bowles operated successfully on the 5th of August in the same year. Dr. Atlee's next operation, a successful one, was performed in March, 1849. Dr. P. J. Buckner also had his first, and an unsuccessful, operation in 1844. In this year ovariotomy was also attempted by Drs. Webster,[3] Weber,[4] E. L. Dudley,[5] and J. Farrell.[6] All four of the patients recovered from the incisions made.

There was no operation of ovariotomy in this country in 1845. In 1846 there was a single operation by Dr. J. L. Atlee, and in 1847 one by Dr. Robert Thompson. Both of these were unsuccessful.[7]

In 1848, Prof. H. Miller, of Louisville, Kentucky, and Dr. P. J. Buckner, operated with success.[8] Dr. Buckner also had an unsuccessful case. Dr. D. Meeker, of Indiana reports a case in the *Boston Medical and Surgical Journal* for September, 1848 (vol. xxxix., p. 116). He treated the pedicle as did Dr. J. L. Atlee. The ligature slipped from one-half of it, and the patient died of hæmorrhage in six hours.

In 1849, five successful and two unsuccessful operations were performed in this country. The former were by Dr. W. L. Atlee (two cases),[9] Dr. Bayless, of Missouri,[10] Dr. W. H. Van Buren, of New York,[11] and Dr. Alden March, of Albany;[12] the latter, by Dr. Gross,[1] now Professor of Surgery, Philadelphia, and Dr. H. J. Bigelow, Professor of Surgery, Boston.[2]

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[1] *American Journal of Medical Sciences*, 1844, vol. vii., p. 44.

[2] Ibid., April, 1845, p. 309.

[3] Dr. Lyman's Report.

[4] Hamilton's Report.

[5] Bradford's Report.

[6] Dr. Lyman's Report.

[7] Ibid., case 5; and *Ohio Medical and Surgical Journal*, 1859, vol. xii., No. 2.

[8] Ibid., vol. xii., No. 2; and *American Journal of Medical Sciences*, April, 1859.

[9] *American Journal of Medical Sciences*, April, 1855.

[10] Bradford's Report, 1859.

[11] *New York Journal of Medicine*, March, 1850.

[12] Ibid., 1850, vol. v., N. S.

Dr. Van Buren's case was unquestionably one of ovarian fibroma, it having been carefully examined and pronounced such by Dr. Alonzo Clark. Secondary cysts, the size of a bean, were already developed in it, and its weight was seven pounds. It had been growing five years, since the patient was sixteen years of age, and had caused a complete prolapse of the uterus. It was adherent to the omentum, and the pedicle was two and one-half inches long and six inches wide, and found to be twisted twice round, though there had been no symptoms of strangulation. It was enclosed in a single ligature, the ends being brought through the incision. The ligature came away on the nineteenth day.

Dr. A. March, Professor of Surgery in the Albany Medical College, operated December 18, 1849. He treated the pedicle as did Dr. J. W. Atlee; but intended the next time to carry the ligatures by the Douglas *cul-de-sac* into the vagina, by means of a sailmaker's needle.

Thus it appears that, previously to the year 1850, twenty-two surgeons had attempted ovariotomy in this country, and eighteen had performed it; that of all the completed operations, thirty-six in number, twenty-one recovered and fifteen died. I allow to Dr. McDowell eight successes in thirteen operations, as stated by Dr. A. G. Smith (p. 241).

During 1850, four successful operations were performed: one each by Dr. A. Dunlap,[3] and Dr. J. Farrell,[4] of Ohio, Dr. E. R. Peaslee, and Dr. W. L. Atlee.[5] There were also five failures, two by Dr. W. L. Atlee,[6] and one each by Dr. Lyon,[7] Dr. Grimshaw, of Delaware,[8] and Dr. Deane, of Massachusetts.[9]

Dr. A. Dunlap completed his operation in twenty minutes, though there were extensive adhesions. His ligatures, applied according to Dr. J. L. Atlee's method, came away on the thirty-first and thirty-fifth days. Incision eleven inches long.

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[1] Dr. Lyman's Report, No. 175.

[2] *Boston Medical and Surgical Journal*, January, 1850, and Lyman's Report, No. 84.

[3], [4] *Ohio Medical and Surgical Journal*, 1859, vol. xii., No. 2.

[5], [6] *American Journal of Medical Sciences*, April, 1855.

[7] Dr. Lyman's Report, No. 175.

[8] *Medical Examiner*, 1850, vol. vi., p. 630.

[9] *Boston Medical and Surgical Journal*, 1851, vol. xlv., p. 474.

Dr. E. R. Peaslee, Professor of Surgery in the Medical School of Maine, operated September 21, 1850.[1] This was a case of double ovariotomy, the first in New England, and the second in this country. It was also the first successful case of ovariotomy in New England by the large abdominal section. Dr. N. Smith's (1821) had then been the only previous successful case.

During 1851, Dr. Buckner reported another successful case; and Dr. W. L. Atlee, Dr. Van Buren,[2] and Dr. Ezra P. Bennett,[3] of Danbury, Connecticut, each an unsuccessful case. Dr. S. Parkman, of Boston,[4] also attempted ovariotomy, but found no pedicle. The patient died. And Dr. Cartwright, of New Orleans, removed an ovarian tumor by catheterism of the Fallopian tube.

Dr. Van Buren's case was a second one of solid ovarian tumor, six inches in diameter. There had been colicky pains from time to time, and at length the tumor became fixed after an attack of peritonitis. Patient died eight days after the operation, of enteritis. The tumor (right ovary) was found to be almost black, at some points greenish, from strangulation; the pedicle being twisted one and a half time round.

Dr. Cartwright's case was one of large ovarian cyst.[5] On the 18th of March, 1850, he passed a gum-elastic catheter, with a wire in it, to the fundus uteri, and withdrew the wire about a half an inch; and after a few trials the point of the catheter entered the left Fallopian tube. After passing an inch, it seemed to enter an expansion of the tube itself, and then was pushed one and a half inch farther and withdrawn. A glutinous substance followed its withdrawal, which he recognized as a hydatid formation (?). He then passed the same catheter, containing a few drops of a solution of nitrate of silver (ʒj to ℥j), three inches into the Fallopian tube and injected it. The glutinous matter escaped *per uterum et vaginam* for a week or more, the tumor meantime diminishing. The operation was repeated four times more before the middle of May. The discharge continued a week after each catheterization except the last, when no fluid was brought away. The patient recovered, with some hardness and fulness remaining at the site of the tumor. (This was probably a case of dropsy of the Fallopian tube.—P.)

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[1] *American Journal of Medical Sciences*, 1851, vol. xxi., p. 371.

[2] *New York Journal of Medicine*, March, 1852.

[3] *American Journal of Medical Sciences*, 1852, vol. xxiii., p. 282.

[4] *Boston Medical and Surgical Journal*, 1851, vol. xlv., p. 421.

[5] *Stethoscope*, 1851, vol. i., p. 414.

In 1852 successful operations were performed by Dr. E. P. Bennett, of Connecticut,[1] Dr. W. L. Atlee, Dr. Evans, and Dr. Howard, of Columbus, Ohio;[2] and two unsuccessful ones by Dr. W. L. Atlee.

In 1853, Professor S. D. Gross,[3] and Dr. Bayless, of Missouri,[4] again operated; and Dr. D. McRuer,[5] of Maine, and Dr. J. P. Bradford, of Kentucky, performed their first ovariotomies. Dr. McRuer's case was successful; the other three were not so.

For the particulars respecting the ovariotomies reported in this country from 1853 to 1863 inclusive, I refer to the work of Dutoit. Their numbers and results are shown in the following table. Only a small portion, however, of all the operations performed have been reported; Dr. W. L. Atlee having reported no case since 1855, and Dr. Kimball, of Lowell, who commenced as an ovariotomist in that year, having but a single case here included. All of Dr. A. Dunlap's cases except twelve, and of my own except four, and of Dr. McRuer's except two, are here omitted, as are also all those of Drs. Sims, Thomas, and Emmet:

YEARS.	Cases.	Successes.	Deaths.	YEARS.	Cases.	Successes.	Deaths.
1853......	8	7	1	1859......	7	4	3
1854......	11	8	3	1860.....	3	3	0
1855......	21	6	15	1861......	3	2	1
1856......	11	8	3	1862......	4	2	2
1857......	5	4	1	1863......	3	2	1
1858......	5	3	2				

The total of the reported cases, up to the last quarter of the year 1863, is one hundred and seventeen; of which, sixty-eight, or 58.12 per cent., recovered, and forty-nine died. Over two hundred additional operations not reported must, however, have been performed by the operators above named, during the eleven years just specified.

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[1] *American Journal of Medical Sciences*, 1852, vol. xxiii., p. 282.

[2] *Ohio Medical and Surgical Journal*, 1853, vol. v., pp. 211, 213.

[3] *Western Journal of Medicine and Surgery*, 1853, vol. xi., p. 29.

[4] *St. Louis Medical and Surgical Journal*, 1853, vol. xi., p. 204.

[5] *Boston Medical and Surgical Journal*, 1853, vol. xviii., p. 74.

During the last seven years also (1864 to 1870 inclusive), but few cases of ovariotomy have been reported by those who have operated most frequently. Dr. Atlee recommenced his reports in 1870, with his two hundredth case. But, from direct correspondence, I am able to supply the deficiency to a great extent, in the statistics for this country. Probably two-thirds of all the ovariotomies in this country during the period just mentioned have been performed by the first five or six operators next to be mentioned. Thus the whole number of operations up to October 10, 1871, is as follows:

OPERATORS.	Cases.	Successes.	Per cent.
Atlee, W. L.	246 [1]	‘About 70 p. ct.’	70.00
Kimball	121	80	66.11
Dunlap, A.	60	48	80.00
Peaslee	28	19	67.85
White	25	17	68.00
McRuer	22	16	72.72
Thomas	27	18	66.66
Bradford [2]	30	27	90.00
Emmet	17	8	47.05
Sims	12	10	83.33
Miner	9	4	44.44
Axford	9	6	66.66
Crosby	5	2	40.00
Bennett	4	3	75.00
Green	8	5	62.50
Tewksbury (Portland)	7	3	42.50
Beebe (Chicago)	6	4	66.66
Hill (Augusta, Maine)	6	3	50.00
Noeggerath	6	1	16.66
Smith, A	5	3	60.00
Jackson (Chicago)	4	3	75.00
Mussey (Cincinnati)	3	1	33.33

This gives a total of six hundred and sixty operations and four hundred and fifty-three successes, or 68.63 per cent. Deducting thirty-eight of these which had been included in the previous list up to 1864, there remain six hundred and twenty-two ovariotomies to be added to the one hundred and seventeen which had been reported before 1864; or a total up to October 10, 1871, for this country, of seven hundred and thirty-nine known ovariotomies. To these I would also have added the cases of Dr. H. R. Storer, could I have obtained their number and results. Dr. A. F. Sawyer also reported seven cases of ovariotomy in California up to 1860, of which six terminated fatally;[1] and has communicated to me thirteen cases since 1860, by letter, of which ten proved fatal.

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[1] "Of all kinds."

[2] Private correspondence with his son. Dr. B. died in October, 1871.

Thus it appears that ovariotomy in this country, originating here in 1809, remained exclusively in the hands of its originator till 1821, when it was again originated by Dr. Nathan Smith. From this time to 1843, though several times attempted, it was actually accomplished only by Dr. A. G. Smith, who had previously assisted Dr. McDowell, by Dr. Rogers, and Dr. Billinger.

In 1843 and 1844 a new impulse was given by the success of Dr. J. L. Atlee, and which was still further aided by his brother, W. L. Atlee, as has been seen.

In 1849 there were seven reported cases, and the number gradually increased till 1855, during which year twenty-one operations were reported. But fifteen of them proved unsuccessful, and ovariotomy received an apparent check, from which it did not recover till 1864. In fact, however, the number of operations has been annually increasing since 1855; Dr. W. L. Atlee, Kimball, of Lowell, and Dunlap, of Ohio, having performed the majority of them without reporting them. But not till 1855 can the operation be said to have secured a permanent footing in the United States, and then only in the country. The surgeons generally of the cities still opposed it for some years afterward. Dr. Van Buren, almost the only exception, had ceased to operate with his second operation. And even when the author of this work read his monograph on the subject before the New York Academy of Medicine, in June, 1864, there was not another surgeon in the city to defend the operation. But by 1865 all opposition was silenced, and the operation everywhere admitted to citizenship.

If it be thought singular that ovariotomy required a longer time to become established in the land of its birth than in England, we may recollect that all advances in our science and our art in any country are uniformly regarded at home, for a time, too much in a personal light, while their real merits are overlooked. And especially would this be so in case of an operation which very few but the originator would, for a time, have the hardihood to attempt. On the other hand, a few British surgeons appreciated the value of ovariotomy at an early period, and by 1850, after the brilliant success of Dr. Clay, of Manchester, as will be seen, the operation was very generally accepted in the provinces, though not yet for several years in the metropolis, of England.

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[1] *American Journal of Medical Sciences*, July, 1860, p. 51.

Ovariotomy was performed in Canada (West) for the first time in 1860, by Dr. Reginald Henwood, of Brentford. The operation was successful.[1]

On referring to the *literature* of this subject in this country, we find far less to note than in Great Britain; and up to 1843 we have only the reports, usually quite brief, of the cases I have mentioned.

It has already been stated that a new impulse was given to ovariotomy in this country by Dr. J. L. Atlee, of Lancaster, Pennsylvania, in June, 1843, when he had his first operation, the first case of double ovariotomy on record, and also successful. C. Aston Key's case occurred several weeks afterward, though he unintentionally removed the second ovary. Up to this time but eighteen operations had been performed in this country, with twelve successes. In his report of the case,[2] he remarks: "I was not then aware of what had been recently accomplished in the last half of the year 1842 by Drs. Clay and Walne (in England); the triumphant results of American surgery satisfied me that if my patient, after a full understanding of her case, and the dangers of the operation, decided upon it, it was my duty to undertake it." He knew that "the leading medical and surgical journal in Great Britain had denounced the operation; had censured those who had attempted it; had pronounced it impracticable; and had even questioned the veracity of those who had been the pioneers in this much-abused operation. There was, therefore, but little sympathy and much censure to be expected, should I fail of success. With my brother only (W. L. Atlee) did I counsel in regard to it, and he concurred with me in the propriety of operating."

In the latter part of the year 1843, Dr. Atlee received from Prof. Gibson an account of Dr. Clay's first three cases of ovariotomy, and Mr. Walne's first two cases—all five being successful; and in his report of his own case[1] he quoted Dr. Clay's remarks in defence of the operation, and of the large incision.

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[1] *American Journal of Medical Sciences*, April, 1861, p. 575.

[2] Ibid., 1844, vol. vii., p. 44.

Dr. W. L. Atlee had his first ovariotomy, an unsuccessful case, March 29, 1844. After giving a very full report of it,[2] he remarks:

> I have given this unfortunate case in full detail, in a conscious spirit of truth and candor, because it is an unsuccessful one. It is not so much to avoid the censure of "keeping studiously and carefully from the public eye the unsuccessful cases of the operation" (Mr. Lawrence), which is a species of dishonesty and empiricism deserving unqualified condemnation, as to do an act of professional duty peremptorily required by the unsettled position of this operation in the minds of the most eminent surgeons, that induces me to its publication. I have carefully avoided giving any color to the case, save what its symptoms have expressed, and I am perfectly willing to furnish it as one of the numerical arguments against ovariotomy. Still, candidly admitting the case to be fairly one of unsuccess, notwithstanding the mitigating circumstances of age, constitution, and insidious inflammation, I, as confidently as ever, consider the operation justifiable in appropriate cases of a disease otherwise desperate and incurable, and where it "secures the only remaining chance of life."—(Blundell, *Med. Examiner.*)

In his remarks upon the case, he considers the objections to ovariotomy that the diagnosis is difficult, and that there is danger of hæmorrhage, and concludes thus:

> There are sins of omission as well as of commission. The good of our neighbor, and our professional duty, always obligate us to risk our reputation in contributing to the one, and in properly exercising the other; and if, when relief can be afforded in a horrible and fatal disease, we are unwilling to hazard our fame, or take responsibility in consequence of danger, then, indeed, we prostitute a high and holy office, fail to exercise it purely, and will have to give an account of it hereafter.

Dr. Atlee also reported a successful case of gastrotomy with removal of a uterine fibroid, in the April number, 1845, of the same journal. On this case he remarks:

> The extension of gastrotomy to fibrous tumors of the uterus may, perhaps, be condemned. This case might have been reported one of ovarian

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[1] *American Journal of Medical Sciences*, January, 1844.

[2] Ibid., July, 1844.

tumor, if I had not preferred to relate things as they are. I pledge myself to the profession to treat this subject in all truth and candor, to falsify, omit, or withhold nothing, and to write down errors, if such there be, in honesty, and without fear—taking censure when deserved. In the decision of a matter of such weight to humanity, personal sacrifices ought to be utterly disregarded. If this operation is to be established, it must be on correct statements; if it fail on such testimony, it fails justly, and forever. But if its establishment be attempted on falsified reports and withheld facts, then human life must fall a sacrifice to personal and professional dishonesty, and the effort must necessarily die, covered with a mantle of human gore. Let the question, therefore, be met as it ought to be, and its history be a record of truth. I have acknowledged that the case was considered an enlargement of the right ovary, and this is the reason why I examined only the uterus and the left ovary before closing the wound, believing the right one to have been extirpated.

He also appends to the report of this case a table of all the operations of gastrotomy up to that time, one hundred and one in number, the most accurate and complete list that had been published. This was appropriated by Mr. T. S. Lee, in 1847, in his prize essay on "Tumors of the Uterus and its Appendages," without acknowledgment.[1]

In April, 1850, Dr. Atlee reported two more cases of gastrotomy. In the former, the tumor was found to be uterine, and was not removed. The patient recovered her former condition. In the latter, a unilocular ovarian cyst was successfully removed. At the end of these reports is an account of the correspondence between himself and Mr. T. S. Lee, before referred to, respecting Dr. Atlee's table, published in 1845. The next year (1851) he extended the statistical table above mentioned, making it include two hundred and twenty-two cases, and published it in the "Transactions of the American Medical Association."[2] He had then operated fourteen times. Though he ceased to report his cases after 1855 till 1870, his perseverance, skill, and success, as an ovariotomist, have exerted a constant and increasing influence in securing the adoption of the operation by the profession in this country. The author's appreciation of his services in this respect were expressed already in 1851, as follows:[3]

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[1] *American Journal of Medical Sciences*, April, 1850, p. 339.

[2] Vol. iv., p. 286 (1851).

[3] *American Journal of Medical Sciences*, April, 1851, p. 386.

"I cannot close without alluding to the obligations under which the medical profession in our country has been placed, by the full and precise reports of his operations for the removal of diseased ovaries, which Dr. W. L. Atlee has, from time to time, given. . . . For only accurate and minute reports of such cases are of any practical value to others."

In April, 1855, Dr. Atlee gave a synopsis of his first thirty cases of ovariotomy,[1] of which seventeen recovered and thirteen died.

In 1856, Dr. G. N. Lyman's prize essay on "Ovariotomy" was published by the Massachusetts Medical Society, containing the fullest and most elaborate statistical table up to that date. In April, 1857, Dr. J. T. Bradford read before the Kentucky Medical Society a report[2] of the cases of ovariotomy which had occurred in that State; and, in 1859, Dr. J. W. Hamilton did the same for the State of Ohio,[3] and Dr. D. McRuer for the State of Maine.[4]

In March, 1864, I presented a paper before the New York Academy of Medicine, on "Ovarian Tumors and their Treatment—excepting Ovariotomy"—of which the following were the conclusions:

"1. Simple tapping of ovarian cysts is merely a *palliative* measure, by no means to be regarded as a harmless one in any circumstances, and proving fatal in one case out of seven (to four) when resorted to for the first time.

"2. All the curative methods I have considered totally fail in cases of polycystic tumors, leaving ovariotomy alone as adapted to them. They all, moreover, in their application to monocystic tumors alone, give but a very slight promise of success, except the iodine injection, and, in a few cases, the tapping *per vaginam* and leaving the canula *in situ*. Besides, they are all, except the iodine injection and the formation of a permanent opening of the cyst into the peritoneal cavity, as dangerous as ovariotomy, or even more so.

"3. Of all the curative methods I have considered, the iodine injection alone (and the tapping *per vaginam* and leaving the canula *in situ* in a few cases) is therefore to be commended, even in the treatment of monocystic tumors.

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[1] *American Journal of Medical Sciences*, April, 1855, p. 387.

[2] Published in pamphlet form.

[3] *Ohio Medical Journal*, January and November, 1859.

[4] *Maine Medical and Surgical Reports*, February, 1859.

"4. Iodine injections are valuable as a curative method, if restricted to single cysts containing a clear, serous fluid; thus proving successful in one-third to one-half of the cases. They may perhaps succeed, if the contents are albuminous, provided the fluid is completely removed from the cyst by injections of warm water before the iodine solution is used. But, the latter failing in either case, ovariotomy alone remains as a curative measure.

"5. Injections of iodine may, however, retard the refilling of simple cysts, and even of one or more of the principal sacs of a polycystic tumor, and may be used with this expectation merely, when ovariotomy is out of the question.

"6. Iodine injections are not to be regarded as unattended by considerable risk, and which is also probably much greater in a patient never before tapped.

"7. If, in a case of a monocystic tumor, circumstances compel us to reject the treatment, with a curative intention, by the iodine injection, or by leaving the canula *in situ*, ovariotomy becomes the sole curative method in this case also, as well as in all cases of polycystic and solid tumors."

In June, 1864, I read a paper before the New York Academy of Medicine on Ovariotomy, in which I endeavored to consider all the points which had been pretermitted in the preceding paper, under the following heads:

I. Should ovariotomy be recognized as a legitimate operation in surgery?

II. In what classes of cases, and in what special circumstances, is it proper to resort to it, and what conditions forbid it?

III. How should the operation be performed?

IV. What is the appropriate treatment after ovariotomy?

I. The first inquiry was answered decidedly in the affirmative.

"Those who maintain that ovariotomy is never justifiable, base their objections upon three distinct grounds:

"1. On statements sustained by mere *a priori* reasoning.

"2. On authority.

"3. On the asserted unreliability of the statistics of ovariotomy.

"1. It ought to be unnecessary to remark that no practical question in our art can ever be settled by either *a priori* reasoning or by mere authority. For, while either is deciding that a thing is impracticable, some one may do the thing in question. Dr. Lardner demonstrated, by that kind of reasoning, that no steamer could ever cross the Atlantic, and had hardly stated his reasons at length before the thing deemed impossible was an accomplished fact. Many similar instances have occurred in the history of our profession. I will merely repeat the objections based on *a priori* considerations to which I have alluded; but they have been so ably answered by Prof. Miller, of Louisville,[1] and Prof. Simpson, of Edinburgh,[2] that I will not further occupy the time with them:

"*a.* The great danger of the operation.

"*b.* So violent a remedy is not sanctioned by the nature of the disease. It may terminate spontaneously.

"*c.* Palliative treatment may prolong life indefinitely.

"*d.* Even if the operation succeeds, it may not secure permanent relief.

"*e.* The difficulty of a correct diagnosis.

"Perhaps, however, the fourth objection needs some explanation. It means that, if you operate and cure the patient, the other ovary may possibly become diseased at some future time. The preceding objections apply as truly to most other capital operations. The last objection alone has any special weight as applied to ovariotomy; but the difficulty of diagnosis really existing in some cases may be practically neutralized in perhaps every instance by the two following rules:

"A. *Never regard ovariotomy as an operation to be performed in a hurry, or while the patient is in good health.* If you wait some months, or a year or two, if possible, you will gain time to form a correct opinion of the case, and, if tapping becomes necessary, the diagnosis can thus be confirmed or corrected; while at the same time the chances of recovery from ovariotomy are on the whole, perhaps, by that palliative operation increased.

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[1] *American Journal of Medical Sciences*, April, 1859, p. 336.

[2] *Edinburgh Monthly Journal of Medicine*, January, 1846, p. 53–67.

"B. *When you commence the operation of ovariotomy, always regard the incision as merely explorative, until you reach the point to determine whether you will finish the operation or not.*

"2. Nor can mere authority decide a practical question, whether of individuals or of learned societies. The first question that always occurs is: What special qualifications have these persons or this body to decide the question? A State Medical Society, a few years since, denounced the operation I am considering, by a formal vote. But what surgeon, even among the members of that association, was in the least influenced thereby? If the self-constituted authority has practical experience or observation, it has a special right to be heard; if not, it has no such special right or influence. It is therefore our duty to challenge, and often to reëxamine, the conclusions in our science which are based on mere authority or the general sentiment of the profession, as well as on *a priori* considerations.

"I will rapidly pass in review some of the authorities opposed to the operation of ovariotomy; the most distinguished being the late Prof. Mütter, of Philadelphia, Mr. Liston, Dr. J. M. Duncan, of Edinburgh, Dr. Robert Lee, of London, and several members of the Imperial Academy of Medicine of Paris. It is true that enough has been done, since these gentlemen promulgated their views, to establish the claims of ovariotomy to be accepted as a legitimate operation; but, as they are still quoted by its opponents, they should receive some notice here.

"Now, it occurs to me to remark, at the outset, that not a single one of the gentlemen I have just mentioned ever performed the operation of ovariotomy; most of them never saw it performed; and one, for a long time after he had committed himself against the operation, refused to see it performed. Besides, a majority of them are mere physicians, who never engage in surgery at all. By what special right, therefore, do they assume to decide this question? Is not the opinion of Dr. Atlee alone, or of Dr. Clay, of Manchester, worth more than any number of opinions from such a source? These two gentlemen are entitled to speak, having performed the operation over one hundred times each. But to return:

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"Prof. Mütter adopted the ideas upon ovariotomy of Mr. Liston, whose volume on Operative Surgery he edited; and, like his original, he 'set his face against the operation, and thought he always should.' His objections were some of the *a priori* considerations I have already quoted. Dr. J. Matthews Duncan,[1] a physician, admits that cases justifying the operation may possibly occur; but asserts that there is no class of cases for which it is a scientific therapeutic measure. I shall expect to define that precise class of cases farther on. He refers 'all such difficult and complicated practical questions as this to the arbitrament of professional opinion, as the ultimate resort;' and adds that 'this opinion is, generally speaking, decidedly against the propriety of ovariotomy.'

"But how does professional opinion always decide every new question at first? In the negative, of course, as is shown by the history of every improvement in our art. The profession are not at once competent to decide affirmatively, and must therefore decide negatively, if at all. The burden of proof lies on the innovator, not on the profession; and, until that proof is given, they are silently indifferent, or inactively opposed to the innovation. So much for the value of the arbitrament of professional opinion in 'such difficult questions as this.' But, in all such instances, some few individuals will exert themselves as active opponents of the novelty. These are the champions of the negative proposition, and it is interesting to see them always going over the same ground. They first attempt to prove that the thing proposed is impracticable; driven from this proposition, they next try to show, by garbled quotations from Hippocrates and Galen, that it was done more than two thousand years ago; and, when the profession are at last obliged to admit the merits of the new procedure, they make a last effort to demonstrate that it is of no account after all. It is therefore no proof that an operation is not justifiable, that the opinion of the profession is at first, 'generally speaking, decidedly opposed to it.' And if it be opposed to ovariotomy up to the present time, I hope that opinion may be modified by the facts hereinafter adduced.

"Dr. Robert Lee is merely an obstetrician, but not an obstetric surgeon, and therefore has no special claim to be heard on this question. He, however, denounces the published statistics of ovariotomy as worthless, since all the cases have not been reported; he himself having, after long research, found thirteen unsuccessful cases which have never been reported. As an offset to this idea, I would remark that I have found over fifty successful cases which have never been reported.[1] Dr. Lee thinks it 'unphilosophical to set aside the experience of the world during a long course of years, and now to substitute in its place the experience and the marvellous success of a few practitioners during the last two years.' But it occurs to us that the experience of the world has not been very extensive in ovariotomy during a very long course of years; while the improvements of the last two years, before Dr. Lee expressed this opinion, were of the greatest importance. He doubts if human life has been prolonged by the operation, when we come to offset those who have been killed by it against those with whom it has succeeded. Still, he concludes by admitting that ovariotomy may sometimes be desirable, though it is unjustifiable when the life of the patient is not in immediate danger, and when there is not a great probability that the life of the patient will be saved by the removal of the disease.[2] The precise modifications this last proposition should receive will be made under the next head. I only add here, as indicative of the animus of Dr. Lee in connection with this subject, that, though repeatedly invited to witness the operation of ovariotomy, and having often appointed to do so, he would always fail, till the 17th of November, 1862—a day thus rendered memorable in the history of ovariotomy—when he actually witnessed an operation by T. Spencer Wells. This operation was successful, but it produced, it would seem, a very peculiar effect upon Dr. Lee. Instead of watching its steps with interest, and discussing in his own mind the chances for a successful issue, as we would suppose so laborious a searcher for truth in connection with this subject would have done, he says, in speaking afterward of the occasion before a learned society: 'I thought of Judas

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[1] *The Lancet*, May, 1857, p. 519.

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[1] Thirteen cases by Dr. Kimball, of Lowell, and forty by Dr. W. L. Atlee, of Philadelphia.

[2] *The Lancet*, May, 1863, p. 339.

Iscariot,' and then approvingly quoted the coarse expression of Liston, who used to call ovariotomists 'belly-rippers, with a B before and a B behind.'[1]

"In closing my remarks on the value of mere authority in deciding a practical question, I wish to record my protest against borrowing our medical and surgical opinions from any foreign source. We should be thankful for facts from any and every source; but I trust we are capable of forming our own opinions upon the facts. To go to France, where ovariotomy is almost never performed, or to Germany, where seventy-four, out of one hundred operated on, die, to inquire if it be right for us in America to operate, is absurd. In this case it is *we* who have the facts."[2]

II. The second inquiry was answered in part by referring to the conclusions of the preceding paper (p. 253, 254). The indications and counter-indications, the method of operating, and the after-treatment, as there stated, will be given in a future section of this work.

In January, 1865, I published the statistics[3] of one hundred and fifty cases of ovariotomy, in continuation of those by Mr. J. Clay, of Birmingham, and comprising all the reported cases for the years 1861–'64 inclusive. I showed, from the analysis of the cases, the circumstances which mainly determined the result of ovariotomy, under the four following heads:

1. The condition of the patient when operated upon.
2. The manner of performing the operation.
3. The after-symptoms.
4. The after-treatment.

1. Under the first head were included: The age of the patient; the married or unmarried state; the general health; the kind, size, and duration of the tumor; the existence or not of adhesions, and of ascites; and the number of times tapped.

2. Secondly, the manner in which the pedicle was managed, and the question whether the peritoneal cavity was sponged out before the incision was closed, were considered. Recent facts led to the conclusion that the treatment by ligature cut short,

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[1] *The Lancet*, February, 1863, p. 139.

[2] Peaslee, "Monograph on Ovariotomy," p. 46.

[3] *American Journal of Medical Sciences*, January, 1865, p. 100.

and the pedicle left in the peritoneal cavity as first practised by Dr. Nathan Smith, will prove to be the best method.

The conclusions stated under the other heads (3 and 4) will be specified farther on. It was found that the custom of giving powerful doses of opiates after the operation had somewhat declined in the last half of the quadrennial period; and my conclusion was that just opiates enough to allay pain, as it may arise, and to secure sleep, should be given, and no more.

In May, 1867, I read a paper before the New York Medical Journal Association, on "Ovariotomy—when and how to operate, and its After-Treatment," from which I make the following extracts:[1]

"A point, then, in connection with ovariotomy, of much interest, is, that the operation is followed, in a very few days, either by death, or, on the other hand, by life and health of indefinite duration. If successful, it is to the woman a resurrection. A patient remarked to me, 'she felt as though she had commenced an entirely new life.' The results suggest the expression of the poet:

'Aut cita mors, aut victoria læta.'

"If performed in a case which is uncomplicated, this is one of the most simple of surgical operations. On the other hand, if complicated in a high degree, it is the most difficult and the most formidable operation the surgeon ever attempts. And not even the most experienced operator can certainly determine beforehand whether he has a simple or a complicated case. Where he had expected no difficulty at all, he may find a condition of things that will require all his coolness, deliberation, and caution, to enable him to get through without leaving his patient dead upon the table. I can say that ovariotomy sometimes demands more of all these qualities, and more care and judgment in the subsequent treatment, than any other I have ever attempted; though, during seventeen years of my professional life, I frequently performed all the capital operations. This peculiarity has not, however, been sufficiently recognized.

"Encouraged by the facility of operation, and the frequent successes of the most favorable cases, many a physician has attempted ovariotomy who would never think of attempting any other surgical procedure, not even the amputation of a finger. The results have been, as might be anticipated: the first case of real difficulty, or perhaps the second, terminating alike the operator's zeal and his success. It is, however, the fact that a simple case, operated on at the most favorable time, will probably recover in spite of a large amount of operative bungling.

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[1] *Medical and Surgical Reporter*, Philadelphia, June 29, 1867, pp. 533–536.

"The first question I will consider is, At what period of the development of the disease shall the operation be performed? The question lies, of course, between performing the operation early, while the patient is still in robust health, and deferring it until she begins to be somewhat reduced by the disease; no one would defer till she is just about to die in consequence of it. The reason, in general, for the first proposition is, that the patient endures a severe operation better if it is performed when she is in full health; a statement which I have not found to be substantiated by statistics—as shown in the paper to which I have alluded.[1] I cannot here specify all my reasons for deferring the operation till the general health begins to fail, but the following are some of them:

"In the first place, if the operation is performed upon a patient in full health, she is, other things being equal, more liable to peritonitis after it; and peritonitis destroys about one-fourth of all who die from the effects of the operation. Mr. T. S. Wells formerly operated on patients in full health, and, when symptoms of peritonitis appeared, bled them, and in that way sometimes saved them. And certainly this is very judicious practice, if the operation is performed thus early; but I think it would be better to diminish the risk of peritonitis, by some delay. Besides, if the patient is in good health, she is certainly in no immediate danger; and we may make sure of adding a certain amount of time to the patient's life by the delay. And we may often wait six months or a year, and find her still in as good health as to-day.

"Again, if we wait, further opportunity is given to perfect the diagnosis; and every one knows how difficult this is in some cases. Even Mr. Wells, whom I saw perform his one hundred and seventy-fourth and one hundred and seventy-fifth operations in July last (1866), and who has now operated over two hundred times, still pronounces his diagnosis with caution. But he waits and reëxamines the case until he feels very positive; and he has very seldom had to record a mistake. If we wait till the patient's abdomen is largely distended, it may become necessary to tap her, though still in pretty good health; and this operation may at once clear up all doubt, if any before existed, whether the case be one of ovarian tumor. If the tumor be one which can be very much diminished by tapping, i. e., if there be one or more large cysts, I not very seldom tap before deciding as to the operation of ovariotomy. Many of the tumors rising in the pelvis, and at first thought to be ovarian, are cysts of the broad ligament, and are cured by a single tapping. I have had two such cases, and consider this a very important point.

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[1] "Statistics of One Hundred and Fifty Cases of Ovariotomy." By E. R. Peaslee, M. D., *American Journal of Medical Sciences*, January, 1865, p. 100.

"A patient, the wife of a professor in one of our Western colleges, called on me some years since, who had seen three or four of the most distinguished surgeons and physicians in this city, all of whom had pronounced her case one of ovarian tumor. I examined her thoroughly, and had not the least doubt that it was such. She went to a distinguished surgeon in Massachusetts, who had no doubt as to its nature, and offered to remove it immediately if she wished. I declined to interfere till tapping should be required; after which it would be time to decide respecting ovariotomy. A year afterward, the tumor began to interfere with respiration and digestion, and I considered that the time for tapping had come. I tapped her, and found the cyst to be one of the broad ligament, and no further operation was required. The uterus, prolapsed by the pressure of the fluid, soon regained its normal position, under appropriate treatment; she gave birth to a child about seventeen months afterward, and has now enjoyed perfect health for the last five years. The fluid contained in these cysts is as transparent as water, and contains no albumen (certainly in most cases), and has great refractive power. It is entirely different from the ovarian fluid; especially in the fact of the absence of albumen.

"Another reason for waiting is, that the success of the operation is greater, other things being equal, if the tumor is large; I would not be willing to remove an ovarian tumor that was only of the size of a fœtal head, in a person of ordinary health, for the following reasons:

"1. If the tumor is large, by its constant pressure upon the peritonæum, the latter is rendered more insensible to irritation and consequent inflammation.

"2. Another reason for not operating when the tumor is small is that, if, after the incision is closed up, the patient should vomit or cough, there may be trouble from straining the muscles, or even from a hernial protrusion through the wound. The latter occurred in one instance where I removed a fibrous tumor of the uterus, and the patient died in consequence. She had a severe cough at the time of the operation, which she had concealed from me by taking opium, knowing that I would not operate if I discovered it. Three or four hours after the operation she began to cough violently. This I could not now control, and the consequence was, a hernial protrusion between the sutures, although they were but half an inch apart. As I was sixty miles from the patient when the hernia occurred, the bowel mortified before I could reach her to reduce it, and she died six days after the operation.

"As an argument against the assertion that a person in full health bears this operation, or any severe operation, better than when somewhat reduced in health, consider the following fact: If we divide the amputations of the lower extremity into two classes: first, operations performed upon persons in full health, as for elephantiasis, or in consequence of accidents, etc., called amputations of expediency (or of necessity); and, second, operations performed upon patients somewhat exhausted by disease, called pathological amputations, as those for disease of the joints, etc., it has been found that, while, of the patients of the first class (amputations upon persons in full health), 42 per cent. die, in amputations of the second class, only 14 per cent. are fatal. An operation upon an ovarian tumor, while the patient is in full health, is literally as well as logically an operation of expediency; and here, as with amputations, the best time for operating is when the health of the patient is somewhat reduced.

"I have now under my observation some ten cases, some of which I have kept waiting a year or more; while others, who, determined to have the operation performed, have found those willing to operate, have succumbed. I have not yet had to regret deferring the operation as I have explained.

"In regard to the operation of ovariotomy itself, I can here only consider the incision, and the manner of treatment of the pedicle of the tumor removed. In regard to the incision, the rule is, that it at first should not be more than one or two inches long, through the peritonæum, but somewhat longer, of course, through the skin, etc., than internally. Next I pass a steel bougie into the peritoneal cavity, and around the tumor if possible, to ascertain if there are any adhesions. Afterward the incision is to be enlarged, or not, as may be required, the rule being to leave it as short as will answer the purpose. It should, however, always be regarded as merely explorative until the operator has decided that the tumor is to be removed. If he finds that there are extensive adhesions, and especially if to the alimentary canal, uterus, or bladder, it is very much better to make a long incision at once, so that the adhesions can be seen before they are torn across; else they may be torn from the intestine, bladder, or uterus, instead of from the tumor, and troublesome hæmorrhage may occur into the cavity of the peritonæum.

"The tumor having been taken away, how shall we treat the pedicle? If the pedicle were in no danger of bleeding after its division, all operators would agree that it should be returned into its natural position, and the wound be closed up. But the only thing that we can rely upon, to prevent hæmorrhage from the pedicle with the greatest possible certainty, is a ligature tied in a knot. If we have tied it tight enough to stop the circulation there, even for a few minutes, we may feel very sure it will serve us, unless it subsequently slips off. I shall consider other methods farther on.

"But, if the ligature is used, then the question arises, whether it should be cut off short, or left hanging out of the wound. The objection of Mr. Wells to the ligature is, that it always produces a sloughing of the stump of the pedicle (the ligature being doubled and carried through the middle of it, one-half is enclosed on each side). 'If it is cut short, the result will inevitably be,' he thinks, 'that the ligature and the stump of the pedicle will slough off, and remain in the abdominal cavity.' But, if the ligature is not cut short, of course it will be all the same so far as the slough is concerned.

"Mr. Wells has even suggested the idea that, on the whole, it would be better to leave the ligatures coming out of the lower end of the wound; since, inasmuch as there must be a slough, the dead, putrefying matter thus formed in the abdominal cavity in this way finds a conduit, which by capillary attraction will drain it off. Dr. Routh, who also takes the same view, made some experiments upon the lower animals, and found that dead meat, even if fresh, in the abdominal cavity, produced a low, putrid fever, of which they died. It is, however, a fact that as large a proportion of the women treated in this way, by ligature, have recovered, as of those treated by other methods; and it is also true that most of them had no symptoms of low fever. None of my patients have had any such symptoms, except as evidently produced by other causes, and I have always used the ligature.

"And the very fact, that patients do recover thus without fever, shows that no absorption of putrid matter has taken place, and therefore that none such has been formed. This was the conclusion I arrived at three years ago, when I read the paper to which I have referred. I have since had opportunity of examining two of my own cases that terminated fatally, in which I applied the ligature, and cut it short. They both died seventeen days after the operation. I have also examined another case lost by another operator, after similar treatment of the pedicle. In none of these cases did any slough occur. In one instance, the ligature had actually cut off the portion which was included in it. In another, it had cut it to that extent that there was left only enough to half-fill the loop; and, in a third, the ligature was so entirely covered up that I could with difficulty find it. But, in every case, there had been an exudation of plasma over the stump and ligatures, which had nourished the part which was beyond the ligature, and attached it to the living tissue in its neighborhood. I state, therefore, without any hesitation, that I consider the point demonstrated, that there is no slough of the pedicle when we put a ligature around it, as I have explained. And, if there is no slough, what is the use of leaving one end of it hanging out of the wound? It seems to me, at the present time, therefore, that the best way to treat the pedicle is, to apply the ligature, cut it short, and close up the whole incision. Still, Mr. Wells has most frequently used the clamp, though he recently stated that he is not yet decided which is the best way to treat the pedicle. I cannot here speak of the relative merits of the clamp, nor can I recommend the *écraseur*, though it has several times succeeded.

"The actual cautery has been applied to the pedicle by several operators, but most frequently by Mr. I. Baker Brown. Nearly a year since, I saw him perform his hundred and first and hundred and second operation of ovariotomy, and the thirty-second and thirty-third in which he had applied the actual cautery to the pedicle. In one of the two cases, the bleeding was not arrested by the hot iron, and he then applied the ligature in the common way, and cut it short. The same had been done in several previous cases; and, of course, all these should have been reported as cases of treatment with the ligature, and not with the actual cautery.

"Finally, it may, in time, be demonstrated that the ligature is preferable in one class of cases, the clamp in another, and the actual cautery in a third. Meanwhile, I hold that, up to the present time, the ligature, as an exclusive method, is to be preferred."

Dr. G. Kimball, of Lowell, Mass., published "Observations on Ovariotomy in Europe," in the *Boston Medical and Surgical Journal*, for December 26, 1867, and January 2, 1868. In January, 1868, Dr. H. R. Storer, of Boston, published an article in the *American Journal of Medical Sciences*, entitled "Pocketing the Pedicle," in which he advocated detaching the Fallopian tube from the cyst, and leaving it in the pelvis. In June, 1868, Dr. A. Dunlap read a valuable paper on ovariotomy, before the Ohio State Medical Society; published in a pamphlet of 22 pages.

In June, 1870, I published a paper in the *New York Medical Gazette*, on the history of ovariotomy, and the life and labors of Dr. Ephraim McDowell. This paper sets forth the facts establishing his claim to priority as an ovariotomist, and which have been appropriated in a preceding part of this chapter. In the same year (1870) I also published in the *American Journal of Obstetrics* (vol. iii., No. 2, p. 300) an article "On Injections into the Peritoneal Cavity after Ovariotomy."

Much valuable information respecting the pathological anatomy and the diagnosis of ovarian tumors, and the method of operating, is contained in the very numerous reports of cases which I have mentioned, but the limits of this part of the present work do not allow more than the previous specification of the publications containing them.[1]

SECTION III.

OVARIOTOMY IN GREAT BRITAIN.

From 1786, when John Hunter published the opinion I have already quoted (p. 235), that hydatid ovarian cysts may be extirpated when they first begin to grow, I do not find the extirpation of ovarian tumors considered by any writer in Great Britain till the year 1824.[2] Dr. McDowell's report of his first three cases, intended for Mr. Bell, had slumbered in Mr. Lizars's possession for more than seven years, and was now to see the light. While I do not explain the former fact, Mr. Lizars had himself now to publish a case of attempted ovariotomy, and Dr. McDowell's report was appended. Just two years previously, Dr. Nathan Smith had published his case in the same journal,[3] as has already been stated. The main points in Mr. Lizars's case were the following:[4]

"The patient had been believed, by Mr. Lizars and 'all the other eminent surgeons who had seen the case,' to have had an ovarian cyst. She had been tapped, though it is not stated whether any fluid was obtained. Making an incision 'parallel with and to the left side of the linea alba about two inches from the ensiform cartilage to the crista of the os pubis,' he found no tumor at all; that both ovaries were healthy; and that the supposed ovarian tumor was merely an accumulation of fat under the skin of the abdomen, and of gas in the intestines. In such circumstances, Dr. McDowell's report of three cases afforded a precedent for his operation, if it did not indorse his diagnosis. Mr. Lizars does not refer to the case of Dr. Nathan Smith, reported in the same journal two years before, except so far as to remark that 'Dr. Smith, of Connecticut, had lately performed the operation successfully.'"

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[1] My own first six cases—all of them successful—are reported in the *American Journal of the Medical Sciences*, for April, 1851, October, 1853, January, 1856, April, 1863, July, 1864, and January, 1868.

[2] Dutoit states (p. 5) that Dr. Bower, of Bosworth, a friend of Dr. Erasmu Darwin, conceived the idea of ovariotomy, the first year of this century.

[3] *Edinburgh Medical and Surgical Journal*, October, 1822, p. 532.

[4] Ibid., October, 1824, p. 247.

Dr. Johnson, the learned and truculent editor of the London *Medical and Chirurgical Review*, speaks of Dr. McDowell's first case, as published by Mr. Lizars, in the following style:[1] "Dr. McDowell visited the patient at the end of five days, though she had come to his own residence to have the operation performed! He found her engaged in making her bed! She soon returned to her native place quite well. *Credat Judæus, non ego.*" "The second case," he says, "is little less extraordinary, if not incredible. We cannot bring ourselves to credit the statement." He also adds in the next number of his journal,[2] in allusion to certain suggestions respecting ovariotomy by Dr. Blundell: "In despite of all that has been written respecting this cruel operation, we entirely disbelieve that it has ever been performed with success—nor do we think it ever will."

The next year, 1825, Mr. Lizars attempted ovariotomy three times in three successive months, February 27th, March 22d, and April 24th. The results, however, were not flattering. All three were believed to be cases of ovarian tumor, at the time of the operations; but two of the tumors were not removed, on account of adhesions. One of these patients died of peritonitis in fifty-six hours, and the other recovered from the operation, to die twenty-five years afterward of an attack of apoplexy. Mr. Lizars states, respecting this last case, that, on opening the peritoneal cavity, "a multiplicity of convoluted vessels presented themselves, of various magnitude, from the thickness of a finger to that of a crow's quill. . . . On minute examination they were found to be the blood-vessels of the omentum majus, enormously enlarged, running on the surface and into the substance of the tumor, which appeared an enlarged ovarium."[1]

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[1] *Medical and Chirurgical Review*, January, 1825, vol. ii., N. S., p. 216.

[2] April, 1825, p. 408.

The autopsy of this case was published by Dr. Myrtle in the *Monthly Journal of Medical Sciences*,[2] who states that both ovaries were found healthy, and in their natural position, and the tumor was attached to the fundus uteri by a pedicle between two and three inches long, formed by a fold of membrane. In a word, it was a subperitoneal outgrowing uterine fibroma. Dr. Simpson was present at the autopsy, and verified this fact. This was Mr. Lizars's fourth and last case in point of time. His remaining case (second in order, February, 1825) had disease of both ovaries. One ovary was removed, the other was not interfered with, and the patient recovered.

These cases were published by Mr. Lizars in 1825, in a small folio with colored plates ; and the last three cases were also reported in the Edinburgh *Medical and Surgical Journal* for July, 1825, vol. xxiv. The editor of that journal remarks of Mr. Lizars's first case that, " though the object of the operation was not attained, its practicability in proper cases was demonstrated, and the safety of laying open the abdominal cavity, and handling the viscera with freedom, made manifest, contrary to the doctrines of the schools." Certainly. But Dr. McDowell and Dr. Nathan Smith had already four times demonstrated this, and in a more satisfactory manner, in this same journal.

It should be added that Mr. Lizars, in all his four cases (when stated), made an incision from near the sternum to the symphysis pubis at the left of the median line. In his second case (the successful one), he transfixed the pedicle by the ligature after passing the latter around the pedicle; and, in the third case (died of peritonitis), he put the ligature round the pedicle, and secured three open-mouthed vessels of the latter. But at that time Dr. Nathan Smith alone had made use of the short incision ; and the treatment of the pedicle is a topic still under discussion.

Mr. Liston remarks of Mr. Lizars's first case, that he had himself treated this patient for lumbar abscess with disease of the spine. She recovered from the former, but the bones had grown together, and her stature had much diminished. She was now a puffy, podgy little woman, with an exceedingly prominent belly. She begged Mr. Liston to perform the operation, but he endeavored to persuade her not to submit to it. Alluding to Mr. Lizars's other operations in private practice, he adds, as if he had assumed the control of both the operator and the operation: "For I took care to prevent him from cutting open women's bellies in the hospital after he became attached to it."[1]

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[1] " Observations on Extraction of Diseased Ovaria," Edinburgh, 1825, pp. 19, 20.

[2] Vol. xii., p. 229, 1851.

In the *Medical and Chirurgical Review* for October, 1826,[2] Dr. McDowell having then published two additional cases of ovariotomy, and Dr. Alban G. Smith another, as we have seen, Dr. Johnson again expresses his impressions respecting ovariotomy as follows:

> A back settlement of America—Kentucky—has beaten the mother-country, nay, Europe itself, with all the boasted surgeons thereof, in the fearful and formidable operation of gastrotomy, with extraction of diseased ovaries. In the second volume of this series, page 216, we adverted to the cases of Dr. McDowell, of Kentucky, published by Mr. Lizars, of Edinburgh, and expressed ourselves as skeptical respecting their authenticity. Dr. Coates,[3] however, has now given us much more cause for wonder at the success of Dr. McDowell; for it appears that, out of five cases operated on in Kentucky by Dr. McDowell, four recovered after the operation, and only one died. There were circumstances in the narratives of the first three cases that caused misgivings in our minds, for which uncharitableness we ask pardon of God, and Dr. McDowell, of Danville.

Dr. Johnson notices the fact that four of Dr. McDowell's five patients were negresses, who "bear cutting, about as well as dogs and rabbits," and adds, "our wonder is rather lessened, as is our hope of rivalling Dr. McDowell, on this side of the Atlantic." Finally, he remarks: "We must confess our skepticism is not yet removed."

After the experience of Mr. Lizars, ovariotomy was entirely discountenanced in Scotland, and was not repeated for twenty years; and then (in 1845) by Dr. Handyside, of Edinburgh. For thirty-seven years, or up to 1862, it had been very seldom attempted in that country; and had succeeded only in a single instance.[4] In Ireland, also, it had been performed but three times up to April, 1862; and always with a fatal result.[1] Dr. Granville, of London, twice attempted ovariotomy, in 1826 and 1827. The last of these two cases proved to be a uterine tumor, and the other was abandoned on account of adhesions.[2]

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[1] *The Lancet*, February 8, 1845.

[2] Vol. v., N. S., p. 620.

[3] *North American Medical and Surgical Journal*, vol. i., p. 30, January, 1826. Dr. H. B. Coates was one of the editors of this journal.

[4] *The Lancet*, January, 1863, p. 70.

In England no attempt at ovariotomy had ever been made, except these two failures of Dr. Granville, till May, 1836, when it was successfully performed by Mr. William Jeaffreson, of Framlingham, for the first time in that country. The main particulars of this case will be given farther on. We have seen that in the United States it had now succeeded eleven times. In this year two other successful operations were performed by Mr. King and Mr. West. In 1838 there was one successful operation by Mr. Crisp; and in 1839 another by Mr. West, who also had one failure this year—this last being the first attempt at ovariotomy in a London Hospital.

In September, 1840, ovariotomy was first completed in a London Hospital, by Mr. Benjamin Phillips, but the patient died.[3] The first successful operation in a London Hospital did not occur till 1846—Mr. Cæsar Hawkins being the operator; and there was not another successful hospital case for twelve years, or till 1858.[4] No case occurred in 1841. Up to 1842 the operation had never succeeded in London, though in the provinces there had been ten successful cases.

Dr. Charles Clay, of Manchester, commenced his career as an ovariotomist September 12, 1842; and saved three out of four patients this year. He soon became the most distinguished ovariotomist living. On November 6th of this year, Mr. D. H. Walne had the first successful case of ovariotomy in London; the large incision also being then made for the first time in the metropolis.

In 1843 (August 1st), C. Aston Key removed both ovaries, the last accidentally; the second alleged case of double ovariotomy.[5] The patient died on the fourth day. Mr. Bransby

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[1] *American Journal of Medical Sciences*, January, 1863, p. 239.

[2] *London Medical Gazette*, February 3, 1843, p. 672.

[3] Reported in the *London Medical Gazette*, October 9, 1840, p. 83.

[4] T. Spencer Wells. "History and Progress of Ovariotomy in Great Britain." "Medico-Chirurg. Trans.," vol. xlvi., 1863.

[5] "Guy's Hospital Reports," October, 1843, p. 477.

Cooper also operated this year, unsuccessfully. Mr. Walne had two successful cases. Dr. Frederick Bird had two successful cases, and Mr. S. Lane one. The last two commenced as ovariotomists in January and in November of this year. There were, in all, seven successful and seven unsuccessful cases in 1843. During the next three years (1844–1846) there were thirty-five operations in England, and twenty-four were successful; two successes and two failures in 1847; five successes and eight failures in 1848; and five successes in 1849.

In 1844, Dr. S. J. Jeaffreson remarked that "if not the originators of the operation, British surgeons at least deserve the merit of having placed it upon any thing like a sure foundation."[1] But it was the provincial surgeons alone in England, as well as in this country, who had done any thing, up to this date, to place ovariotomy on a sure basis; since only four or five operations by metropolitan operators had been successful, and all of them but one during the previous year. There had now been fifteen successful cases in the provinces, and but six in London. Up to this date, twelve successful operations had been performed in this country, and all of them also by provincial surgeons. Besides, in England as in this country, several experienced hospital surgeons, after a single failure, perhaps, by themselves, denounced the operation, and exerted all their influence against it.

To Dr. Charles Clay, of Manchester, however, more than to all other operators, the credit belongs of having placed the operation of ovariotomy on a sure foundation. Fehr calls him "the original hero" of this operation. He had performed the operation six times, and three times successfully, before 1844, and up to 1850 had had twenty-one successes out of thirty-three operations; or as many as all the other British operators together had then achieved. He continued to maintain his preeminence, and in 1866 had operated one hundred and thirty-seven times, and had ninety-five recoveries. He at length overcame in a great degree the opposition in England to ovariotomy, by his fairness in reporting his cases, his scholarship, and especially by his success.

Dr. Clay was graduated at the University of Edinburgh, and had Mr. Lizars as one of his preceptors. He commenced practice in 1822, and therefore had had twenty years of experience as a surgeon before performing his first ovariotomy, a successful case, in September, 1842. In his report of that case he claims to have performed the first operation of ovariotomy in England, by the long incision, which distinction is also asserted for him by Mr. Walne.[1] Dr. Simpson, of Edinburgh, was his early and intimate friend, and obtained his ideas of ovariotomy, which he so eloquently defended in 1846, from witnessing many of Dr. Clay's earlier operations, and some of them upon his own patients. The term ovariotomy was suggested by Prof. Simpson to Dr. Clay, as we have already seen.

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[1] *London Medical Gazette*, vol. i., N. S., p. 48, October, 1844.

Dr. Clay has contributed about one hundred papers to medical journals, commencing in the London *Lancet* in 1839, and in the *Medical Times and Gazette* in 1840. He was also editor for two years of the *British Record of Obstetrics, Medicine, and Surgery.* He has published several professional works, the principal being his "Manual of Obstetric Operative Surgery," with ninety plates, 1870. I might also add a long list of non-professional publications. His experience in midwifery counts up twelve thousand cases. He has been second to none in his country in the knowledge of all the subjects allied to this operation, having had twenty-five hundred volumes on obstetrics alone for reference in his own library, and which he has donated to the Manchester Medical Society and the London Obstetrical Society. Though now over seventy years of age, he still wields the pen or the scalpel, as circumstances require, and has never confined his cutting to the latter only.

Taking a retrospect of his own labors in connection with ovariotomy, in March, 1863, when he had operated one hundred and eight times, with seventy successes, Dr. Clay thus expressed himself: "I believe I have been mainly instrumental in bringing ovariotomy before the public, although I have had much to contend with, and have often been grossly misrepresented; still, in spite of every opposition, I have lived to see it established (under proper circumstances) as a legitimate operation in surgery, and practised by others with a fair share of success. Had I never accomplished any other great object in my professional career than this, I still fancy I shall not have lived altogether in vain, but have contributed something to the benefit of my species. To all who have the slightest idea of the magnitude and uncertainties of this operation, the incessant care and constant attention required subsequently to conduct such cases to a successful issue—*such* will readily admit that a rate of rather more than seventy per cent. of recoveries is a victory in modern surgical art worth contending for."[1]

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[1] *London Medical Gazette*, December 16, 1842.

Already, therefore, in 1847, Mr. Southam remarked that a majority of those in England who made the diseases of women their more especial study, regarded ovariotomy as perfectly justifiable.[2] The editor of the *Gazette*, however, adds that he does not think Mr. Southam is justified in "venturing so positive an assertion." Mr. Southam, however, spoke for the country alone, and not for the metropolis. But, in 1850, it had been generally accepted by the provincial practitioners. And, up to 1850, ovariotomy had been performed in Great Britain ninety-one times, and fifty-eight times successfully.

To resume our historical sketch: two successful operations were performed in England in 1850 by Mr. Paget and Mr. Duffie. The latter first left the pedicle outside of the incision. I. B. Brown operated nine times from 1852 to 1856, saving but two of his patients. He then ceased for more than four years. And besides these cases there were only nine successful operations in England in the seven years from 1850 to 1857.[3] During these seven years there were nineteen failures. Mr. Erichsen commenced in 1853. In 1857 there were three successful and two unsuccessful cases. Mr. J. Hutchinson's first operation was in September, 1858, and he first used the clamp in the treatment of the pedicle. The whole number for 1858 was eleven, of which seven were successful, and four died.

T. Spencer Wells commenced his career as an ovariotomist in February, 1858, and which must probably ever remain unrivalled, he having already, in less than fourteen years, up to September 1, 1871, performed the operation of ovariotomy four hundred and forty times. He has frequently been called to perform the operation on the Continent; and his success and influence had secured the general adoption of ovariotomy in the metropolis by 1860.

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[1] "Obstetrical Transactions," vol. v., p. 65.

[2] *London Medical Gazette*, September 17, 1844.

[3] Dr. Clay's cases are not included since the year 1850, as they were not reported from 1850 till 1860.

The year 1859 was an unfortunate one, showing eighteen deaths out of twenty-seven cases. In 1860 Dr. Jenner and Dr. W. Tyler Smith had each a successful case; and during this year there were twenty-four cases and thirteen cures. Mr. Bryant, of Guy's Hospital, had his first case (fatal) in 1860; and now the operation was generally accepted in the metropolis.

Encouraged by the success of Mr. Wells, and convinced by the candor and fairness of his reports of all his cases, unsuccessful and successful, and his advanced views both in regard to the diagnosis of ovarian cysts and to all the points of the operation itself, several other surgeons were soon found performing it; and in 1861 we find thirty-six operations in England with twenty-five successes (six of the successes and five failures by Mr. Wells), against the ten cases in all in 1858, and three of which were by Mr. Wells. Childs, Maunder, Grimsdale, Hicks, Foster, and Gamgee, commenced this year.

Up to 1862 the three principal operators in Great Britain had had the following experience:

OPERATORS.	Cases.	Cures.	Deaths.
Dr. Clay	110	77	33
Mr. Wells	76	53	23
Mr. I. B. Brown	52	28	24

In 1862, Dr. Litchfield and Mr. Pollock reported each an unsuccessful case; and there were this year, in all, fifty-nine cases with thirty-five recoveries—Mr. Wells having had twenty of the cases and fifteen cures. Mr. Fergusson, Mr. Jones, and Mr. Loder, commenced in 1863; also Mr. Simon, Mr. Hulme, Mr. Helmuth, and Mr. Beale. The whole number of cases was thirty-six, with twenty-seven recoveries. Of these, Mr. Wells had fifteen cases and twelve cures.

The whole number of reported cases of ovariotomy in Great Britain up to December 1, 1863, is three hundred and seventy-seven, of which two hundred and twenty-eight, or

60.68 per cent. were successful, and one hundred and forty-eight patients died.

During the six years from 1864 to 1870 the operation of ovariotomy has been to such an extent monopolized by Mr. Wells—and especially till 1868—that comparatively few names of first operators are to be found in England. Dr. Clay, of Manchester, has, however, by no means been idle during this period, as will be seen below, though now in his seventy-first year. I mention also Mr. I. B. Brown, Mr. Bryant, of Guy's Hospital, Mr. Willett, of St. Bartholomew's, Dr. Hall Davis, of the Middlesex, Dr. Priestly, of King's College Hospital, Dr. R. Lee, of St. George's, and Mr. Erichsen, of the University Hospital, as active in this field.

During the last seven years not less than six hundred and fifty ovariotomies have been performed in Great Britain, making a total of between one thousand and eleven hundred operations. Of these, more than three hundred were performed by Mr. Wells alone. The following is the total experience of some of the most practised operators, up to the last quarter of 1871, unless otherwise stated:

OPERATORS.	Cases.	Cured.	Died.	Saved.
Wells	440	328	112	74.54
Clay	250	182	68	72.80
Brown (to 1870)[1]	120	84	36	70.01
Keith (end of 1871)	136	111	25	81.61
Bryant (1870)[1]	28	17	11	60.71
T. Smith (1870)[1]	20	16	4	80.00
Willett (1870)[1]	12	4	8	33.33

In Scotland, as we have seen, only a single successful operation of ovariotomy had been performed since Mr. Lizars's single case of success, in 1825, up to the year 1863.

In this year, Dr. Thomas Keith, of Edinburgh, performed his first operation; and up to January 1, 1872, having performed one hundred and thirty-six operations, he has attained to the highest success yet achieved in Europe—81.61 per cent.; and, since the reports of his cases show that they have by no means been usually of a promising character, but very often quite the reverse, to him must be awarded the highest order of skill, both as an operator, and in the after-treatment of ovariotomy cases. Few operations have been performed in Scotland, till within the last five or six years, except by Dr. Keith, who still has at least one-half of all the cases. Several operations have, however, been recently performed at Glasgow, especially by Dr. McLeod and Dr. Buchanan.

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[1] Grenser.

In Ireland, ovariotomy had been but twice successfully performed up to the last quarter of 1863;[1] and is even now but seldom attempted. A letter of September, 1871, from one of the most distinguished hospital physicians of Dublin, states that Dr. Hayes, of the Mater Misericordiæ Hospital, recently had a successful case of ovariotomy, and proposes soon to operate again. He had, however, himself hesitated to advise the operation, for reasons which, considering them entirely obsolete, I shall not here repeat. Nevertheless, he alludes to the experience of Mr. T. S. Wells as if familiar with it.

Of the *literature* of Great Britain respecting the subject of ovariotomy, I shall give a more extended sketch, to show its influence in securing the comparatively early adoption of the operation in that country. The first contribution upon this subject has already been spoken of, viz., the work of Mr. Lizars, containing his four cases, published in 1825.[2]

Mr. William Jeaffreson, of Framlingham, reported his case in 1837,[3] the operation having been performed May 8, 1836. The incision was between ten and twelve lines long. He removed twelve pints of clear serum by tapping, and extracted the collapsed cyst and another containing two ounces of fluid. He then enclosed the pedicle in a single ligature, cut its ends close to the knot, returned the pedicle, and closed the incision by two sutures, and adhesive plaster, and applied a compress of lint. The patient recovered, and afterward gave birth to three daughters and one son. She had had three children before the operation. Mr. Jeaffreson knew the details of the operation fifteen years before, of Dr. Nathan Smith, and differed from the latter only in making a shorter incision (about one inch instead of three inches.) He had ascertained three years before, by an experiment on a woman who had died with, but not in consequence of, an ovarian tumor, that such a cyst without adhesions might, when collapsed, be extracted through an incision one inch long. He "considered it the *sine qua non* that this operation should be performed previous to adhesions taking place between the sac and the adjacent viscera." Mr. King, of Saxmundham, who soon afterward had a successful case of ovariotomy, assisted Mr. Jeaffreson in the operation.

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[1] Dutoit. "Die Ovariotomie in England, Deutschland und Frankreich."

[2] "Observations on the Extraction of Diseased Ovaria," Edinburgh, 1825.

[3] "Transactions of the Provincial Medical and Surgical Association," vol. v., p. 239.

Mr. B. Phillips reported his case in 1840.[1] The incision was a little over one and one-half inch long, and a single ligature was passed round the pedicle, cut close, and returned into the abdominal cavity. The patient died in four days. There were six to eight ounces of blood in the peritoneal cavity, and very little peritonitis. The ligature was in place, but had not been applied tightly enough. He remarks that, "for all practical purposes, it is safe to assume that to Mr. Jeaffreson belongs any merit which may attach to the plan of treating ovarian cysts, by extraction through a small opening in the abdominal parietes."

Mr. Walne, at the close of 1842, thus appreciated the operation of ovariotomy:

> Let me not be supposed for a moment to recommend this operation as one to be undertaken in any but well-selected cases to which it is adapted; still less let me be supposed to advise that any surgeon should engage in its operation who has not, by habits of operating—yet more by long habits of careful observation and treatment of disease generally, and by very considerate and studious examination of the nature and connections of this particular disease, and the tendencies of the viscera, which may be involved in mischief by an ill-judged operation, or ill-conducted after-treatment—qualified himself to cope with difficulties from which it is unreasonable to expect an exception.

His reasons for preferring the long incision were the following, though he quotes Dr. N. Smith's case as the type of the "minor operation," the incision having been three inches long:

> It does not appear that a less extent of wound diminishes the danger of an operation in any material degree, if at all; and that the complications which occasionally present, without being foreseen in every instance, can

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[1] *London Medical Gazette*, October 9, 1840, pp. 83–88.

be better appreciated, and more suitably dealt with, by the surgeon, through a free opening than through a small one.

For example, the effusion of blood, or the escape of fluid from the cyst into the peritonæum, either of which is a most dangerous complication of the difficulties inseparable from any method of operating, can with no certainty be avoided in the minor, but may assuredly be remedied if they should occur in the major operation. Adhesions, too, can be divided, the parts can be cleansed, and arteries tied with facility if necessary, and the operator's mind freed from doubt as to the state of the internal parts, before he carefully closes the wound. These are circumstances which the experienced operator can appreciate, and, if he should not be blinded by an undue apprehension of peritoneal inflammation, he will be sure to estimate highly such palpable advantages.[1]

Mr. Walne published his first three cases, all successful, in a pamphlet of eighty-six pages, in 1843, they having been previously reported in the *London Medical Gazette.*

Early in 1843, Dr. Clay reprinted, in a quarto pamphlet of eighteen pages, the reports of his first five operations, from the *London Medical Times.* His statistics and conclusions were very severely criticised by the erudite editor of the *British and Foreign Medical Review* in the October number of that journal (1843); and he accuses Dr. Clay of treating Mr. Jeaffreson's operation with unfairness. In the course of his editorial remarks, Dr. Forbes speaks of "Dr. N. Smith's operation as conducted according to Mr. Jeaffreson's plan, except that the incision was four inches long (actually three inches) instead of an inch and a half (actually ten to twelve lines), p. 390."[2] He concluded his general reprobation of the operation of ovariotomy with the impressive injunction of Hufeland: "Thine is a high and a holy office, see that thou exercise it purely; not for thine own advancement, not for thine own honor, but for the glory of God, and the good of thy neighbor. Hereafter thou wilt have to give an account of it."

Dr. Frederick Bird's first operation (June 26, 1843) was reported in the *London Medical Gazette*, August 18, 1843, and he attributes its success to the following causes:

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[1] *London Medical Gazette*, December 9, 1842, pp. 439, 444.

[2] Dr. Smith's case had been briefly noticed in the *London Medical and Physical Journal*, vol. xlviii., p. 449; and had been translated into Italian in vol. xxviii. of Osmodei's "Annali Universali."

1. The high temperature (85°) of the room during the exposure of the abdominal viscera.

2. The after-treatment, which partook more of a dietetic than a medical character.

3. The form of operation adopted.

And here it should be remarked that to Dr. F. Bird belongs the merit of distinctly stating the reasons in favor of the short incision (in this case three and a half to four inches) as opposed to the long incision of Dr. Clay and Mr. Walne on the one hand, and the very short one of Mr. Jeaffreson, Mr. King, and Mr. Crisp, one to one and a half inch, on the other. He says the cases of Dr. Clay have sufficiently demonstrated the danger of attempting extraction through a very small opening. He first, in England, adopted Dr. Nathan Smith's method, except that he did not cut his ligatures close to the knot, but brought them out through the wound. He distinctly speaks of the advantage of having "the opening sufficiently large to allow of the introduction of the hand into the abdomen," for any necessary purpose, and states that he "would not dissent from the employment of a larger incision in cases in which the partially solid state of the tumor might prevent its sufficient reduction by puncture."

Mr. C. Aston Key's case (August 1, 1843) was reported in Guy's Hospital Reports, October, 1843. It terminated fatally on the fourth day, from peritonitis. This has been noted as a case of double ovariotomy; but it was such accidentally, and not intentionally. The incision extended from near the ensiform cartilage to a point four inches below the umbilicus; and "the tumor (left ovary) was thus perfectly exposed, and presented no adhesions whatever. . . . There was a cord-like pedicle at the right side of the lower part of the tumor, around which a single ligature was placed and divided." Subsequently the pedicle of the cyst was treated as by Dr. F. Bird. On examination of the mass removed, there were two portions on its pelvic extremity, and four or five inches apart, which "marked its attachments to the uterine appendages." One of these, which Mr. Key had first divided, corresponded to the right ovarium. The other was the pedicle of the tumor, and contained six arteries of rather larger calibre than a crow-quill, and several much more capacious veins.

The *post-mortem* examination showed that both ovaries were absent; the left Fallopian tube was truncated about an inch from the uterus, and encircled tightly by a ligature—the other two ligatures having been displaced before the parts were removed for examination. The right Fallopian tube remained entire. Thus the right ovary was shown to have been adherent to the cyst, and to have been removed together with it, without any suspicion of the character of the adhering organ.

In 1843, Mr. G. Southam, of Manchester, reported his first case in the *London Medical Gazette*, November 3d, and his second case in 1846 (same journal, May 22d). In the first case (October 20, 1843) both ligatures, left coming through the lower angle of the wound, were retracted into the abdominal cavity, by a great tympanitic distention; but no mischief ensued. Some of the points of these papers will be referred to farther on.

Ovariotomy was first publicly discussed in England at a meeting of the Medical Society of London, December 11, 1843, after the report to that body by Dr. F. Bird of his second case. Drs. Bird and Risdon Bennett, the president (Mr. Pilcher), Mr. Linnecar, Mr. Dendy, and Mr. Bishop, were the principal speakers.[1]

Dr. Bird stated that he had kept the room at a temperature of 85° during and for two days after the operation, and then lowered it to 75° and gradually less. His incision was nearly six inches long, and should always be long enough to admit of the introduction of the hand.

Dr. Bennett spoke of the difficulty of diagnosis of ovarian tumors, and inquired of Dr. Bird how he would distinguish between a uterine fibroid attached to the fundus uteri and an ovarian tumor.

Dr. Bird admitted the difficulty, and would rely mainly on percussion; but, if that did not give a satisfactory result, he would tap the patient and examine the tumor when partially evacuated. He would not operate unless the general health had begun to suffer.

Mr. Linnecar inquired if Dr. Bird regarded the complication of ascites with ovarian tumor as dangerous.

Dr. Bird did not, if it resulted from the mere pressure of the tumor; but, if inflammation were still going on in the serous membrane, he would be unwilling to operate. He further remarked, in reply to a question, that our means of detecting adhesions are very limited; and for this reason the exploratory incision was so very valuable: if the tumor could be seen, through the latter, to ascend and descend with the diaphragm, there cannot be any adhesions.

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[1] *London Medical Times*, December 16, 1843, p. 150.

Mr. Linnecar, alluding to the well-known tendency of ovarian tumors to enlarge, and their not being under the control of medicine, inquired why they should not be removed as soon as they are actually diagnosticated.

Dr. Bird said the operation would be more difficult in the early stage of the disease (as he explained). If the patient be in good health, there is greater chance of consecutive inflammation.

Mr. Dendy contended that adhesions ought not to be regarded as militating against the performance of the operation. They are broken down frequently in the operation for hernia, and yet the patient recovers.

Mr. Bishop thought that delay was equally dangerous with too early an operation, as there is a great tendency in this disease to assume a malignant character.

Mr. Pilcher complimented Dr. Bird very highly on the skill he had displayed, and the candid manner in which he had narrated his proceedings. He held, with Dr. Bird, that the existence of adhesions contraindicated the operation in the present state of our experience, though ultimately this objection might be found not to be valid.

The discussion was resumed at the next meeting of the society, December 18, 1843.[1]

Dr. Waller defended the long incision, i. e., one long enough to allow the tumor to be taken out entire—in opposition to Dr. Bird's incision of six inches or less. He specified the fact, as one reason of Dr. Clay's and Mr. Walne's success, that they heated the room before the operation to a certain temperature (70° to 75°).

Mr. Crisp (not the surgeon who had successfully operated in 1838) thought that sufficient merit had not been awarded to Mr. Jeaffreson, of Framlingham, who had removed ovarian tumors fifteen or sixteen years ago, on three occasions, and he believed, but was not sure, successfully. With respect to the superiority of the larger incision, he asked Dr. Waller if he had any objection to a small incision being made in the first instance, and enlarged afterward if necessary.

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[1] *London Medical Times*, December 30, 1843.

Dr. Waller said that is always done, in the shape of an exploratory incision, to ascertain the nature of the tumor, and whether adhesions exist. Five of the cases in which Mr. Jeaffreson had operated, terminated fatally. In each case he had employed the minor incision (one to two inches only).

Dr. R. Bennett attributed the success of Dr. Clay and Mr. Walne to the adoption of the sedative plan of treatment, and the not having recourse to bleeding, etc., when there were indications of approaching inflammation.

In June, 1844, Mr. Benjamin Phillips, of the Marylebone Infirmary, read a paper on ovariotomy, containing a statistical table, before the Royal Medical and Chirurgical Society. He maintained that "the opinion of any man, however eminent, pronounced without a careful estimate of the materials which have now become available to us, cannot and ought not to determine the question, and the only means we have for arriving at a correct diagnosis are, so far as I know, furnished by the cases which will be hereafter described." He then gave a list of eighty-one cases, of which sixty-one were cases of actual ovariotomy; in fifteen cases adhesions or other circumstances prevented the removal of the tumor, and in five instances no tumor was found. Of the sixty-one cases of oöphorectomy, thirty-five recovered and twenty-six died. Of the fifteen cases of unfinished ovariotomy, nine recovered and six died. All the five in whom no tumor was found, recovered.

He thinks, in regard to the question, then under discussion, whether the long or the short incision be preferable, that "the evacuation before the extirpation of the cyst, and not the exact length of the incision, is the important distinction between the two operations." He had himself, in 1840, unsuccessfully performed the first completed ovariotomy in London, the incision being "little more than two inches long." He makes some very judicious remarks upon the diagnosis of ovarian tumors, and concludes that "the existence of adhesions does not lessen the chances of success, nor so far complicate the operation as to constitute a bar to its performance, if it be admitted to be a proper operation where no adhesions are present." He is decidedly in favor of the short incision, but leaves it to be fairly discussed by the society, since "that circumstance will exercise a useful influence in determining whether it shall be a recognized operation in surgery or not."

Mr. Phillips's paper was discussed at a meeting of the Royal Medical and Chirurgical Society, held June 18, 1844.

Dr. Moore deprecated the opinions expressed in the society on a late occasion, against the reception of ovariotomy among the number of recognized surgical operations.

Mr. I. B. Brown (a visitor) dissented from Mr. Phillips's statement as to the utter inefficiency of therapeutic measures in ovarian tumors. He had himself succeeded in four cases, by mercury carried to slight salivation, diuretics, and tonics, and compression of the tumor, combined with tapping.

Mr. Frederick Hale Thompson was astonished to hear the opinions expressed by the last speaker. He warmly advocated the operation of ovariotomy, though it had not yet been performed at any hospital except Guy's. Indeed, he believed the operation was not adapted to hospital practice, as such institutions were unable to command the numerous minute circumstances essential to its success.

Dr. Frederick Bird, being present, was invited to address the society. He objected to the paper, that it comprised, in one common class, cases where the incision had revealed no tumor, those where the tumor could not be removed, and those where it had been removed. . . . He had faithfully tried Mr. Brown's plan in five cases without the least benefit, and in one with apparent disadvantage. In respect to the operation, he himself adopted neither the minor nor the major operation strictly so called, but an incision of medium length, to avoid the evils of irritation from unnecessary manipulation in the very small, and of unnecessary shock to the system by the very large incision. . . . He regarded the high temperature (85°) as prophylactic against peritoneal inflammation, the main danger of the operation.[1]

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[1] *London Medical Gazette*, July 5, 1844, pp. 474-476.

Dr. F. Churchill published his statistical table in 1844.[1]

Dr. Samuel J. Jeaffreson[2] published a series of papers on the "Pathology and Treatment of Ovarian Diseases," in 1844.[3] In one of these,[4] he gives a table including seventy-four cases in which ovariotomy was attempted; in twenty-three it was not completed, and ten deaths were the consequence of the attempts. Of the fifty-one cases of ovariotomy, thirty-seven recovered and fourteen died. The short incision was practised in six cases, of which five recovered. Dr. Jeaffreson sums up his opinions on the subject as follows:[5]

1. It has been sufficiently established that the extirpation of ovarian tumors is practicable, and that Nature is competent to effect the great processes of repair which so serious an operation demands.

2. That, as the mortality attending upon these operations has been shown to be greatly heightened by taking into consideration cases in which, from previous errors in diagnosis, the tumors have been found to be other than ovarian, or, being ovarian, from adhesions or other causes, could not be removed, increased diligence and attention are required, on the part of surgeons, to the previous diagnosis.

3. That the modes of operating, after-treatment, etc., demand the careful and impartial consideration of the surgeon, as greatly affecting the possibility of completing the operation, as well as its ultimate result.

4. That, as, whatever future improvements may diminish the risks of the operation, it must ever be considered one of great imminence, it cannot be recommended excepting in those cases in which the bulk of the tumor is productive of much misery and inconvenience, and is alreading inducing such constitutional disturbance as to threaten some probable limit to the existence of the sufferer.

5. That, however much assistance we may derive from general rules, the propriety of operating in each case must be decided with a due consideration of the merits and peculiarities

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[1] *Dublin Medical Journal*, July, 1844.

[2] Physician to the Chelsea, Brompton, and Belgrave Dispensary.

[3] *London Medical Gazette*, August to October, 1844.

[4] Ibid., October 18, 1844, pp. 80–87.

[5] Ibid., October 25, p. 107.

of the case in question. A few rash operations must inevitably bring discredit upon the measure, however useful and valuable it may be when conducted with prudence and judgment.

6. The fluid forms of tumor are the most appropriate for operation. They are generally the most rapid in their growth, and frequently refill with great rapidity after their evacuation by paracentesis. The risks of adhesion are less, as also the probabilities of mistake in diagnosis, or of other organs being diseased. Remedies, too, have the least power in the cure of this form of affection. In the monolocular variety, the operation could hardly be recommended, so long as tapping afforded perfect relief, and the fluid was very slow to reaccumulate. The multilocular form of disease is by so much the more appropriate for extirpation, in that tapping is attended with greater risk, and is calculated to afford but a limited degree of relief.

7. The mixed forms of tumor are the least appropriate for extirpation, and proportionately so as they contain a greater amount of solid matter. There is a greater risk of adhesions, and also of errors in diagnosis; the opening required for their removal must be large in proportion to the mass of solid. The more solid tumors, if of an inert character, are slower in their growth, and may never induce much suffering or risk of life. Their cure is sometimes effected by Nature or well-directed medical skill. Their growth is sometimes suddenly arrested, and they continue stationary and comparatively innocuous.

8. Somewhat in exception to the last conclusion respecting the more solid but indolent ovarian tumors, it becomes questionable whether their removal may not be sometimes desirable when their presence has induced ascites. Ascites thus caused can rarely be permanently cured by medical or surgical means, so long as its exciting cause continues in existence; and life will, I believe, rarely be much prolonged under such circumstances. In the forty-five cases above related, in which ovarian tumors were removed by the major operation, ascites is actually stated to have complicated eight cases; in all, the ovarian tumors were of the mixed character; and in six out of the eight cases the operations were successful.

9. Extirpation cannot with propriety be recommended, when

the least suspicion exists of the malignant character of the disease, or when it is of strumous origin, and is connected with scrofulous disease of other organs, as the absorbent glands, joints, internal viscera, etc.

10. In recommending the operation, it may not be amiss to view it as a means of removing an enlarged growth, which, whether solid or fluid, is producing misery and risk to life, chiefly by its mechanical inconvenience of bulk, or its drain upon the system: hence the surgeon will be alike cautious of operating in those cases in which the local disease, indolent and slow in its growth, produces comparatively little inconvenience and risk; and in another and very opposite condition of things, in which, without his being able to discover precisely the cause, the constitution appears shattered and impaired, in a degree disproportioned to the extent and importance of the local disease. In such cases, there is too great reason to fear that there is more mischief going on in the system than would be removed with the extraction of the ovary.

Dr. J. Rose Cormack published a severe article against the operation in 1844,[1] and a statistical table of cases in 1845.[2] Of sixty-five cases of ovariotomy collected by him, forty recovered and twenty-five died. Of twenty-four cases of attempted ovariotomy, fifteen recovered and nine died. In five of the twenty-four cases no tumor at all was found, and all these patients recovered. It was Dr. Cormack's "conscientious conviction that ovariotomy is an unwarrantable operation."

At the meeting of the Medico-Chirurgical Society of Edinburgh, December 3, 1845, Dr. Bennett read a paper on ovariotomy, and reported Dr. Handyside's fatal case of double ovariotomy. This subject was discussed at the next meeting, December 17, 1845, when Prof. Simpson made his eloquent and conclusive defence of ovariotomy, as a justifiable operation. Dr. Cormack and Mr. Spence spoke in opposition to it.[3]

In 1846, Mr. Solly, in connection with the report of his first case—an unsuccessful one—delivered a clinical lecture at St. Thomas's Hospital,[4] giving a view of the state of ovariotomy at that time. After referring to two able articles in the *British and Foreign Quarterly Medical Review*,[1] from one of which I have quoted (p. 279), as decidedly opposed to the operation, he gives at length the favorable opinion of Prof. Simpson, of Edinburgh, as noted in the preceding paragraph. His remarks respecting the slipping of ligatures will be again referred to.

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[1] *Edinburgh Monthly Journal of Medical Science*, January, 1844, pp. 55–68.

[2] Ibid., May, 1845, pp. 403–415.

[3] Ibid., January, 1846, pp. 53–67.

[4] *London Medical Gazette*, June 17, 1846.

In the same year (September 23d) Mr. Cæsar Hawkins also gave a lecture at St. George's Hospital,[2] in reporting his first, a successful case, and the first successful operation by a surgeon of and at a London Hospital, though he states that it had been performed three times before.[3] He had been opposed to the operation till Mr. Jeaffreson operated by the short incision; and was still opposed to it in the other form, by the long incision. He believed that very few tumors, whose bulk could not be diminished by tapping, should be removed at all. He did not think a high temperature of the room important.

On November 14, 1846, Dr. Frederick Bird read a paper before the Westminster Medical Society on the "Diagnosis and Pathology of Ovarian Tumors." He had found in fifty cases occurring in his own practice, where ovariotomy had been negatived, the average duration of life had scarcely exceeded three years from the commencement of abdominal enlargement. He relied mainly, in determining whether there were adhesions, upon the effects upon the movements of the tumor from forced respiration; and extolled the uterine sound, then recently introduced by Prof. Simpson, in the diagnosis of ovarian tumors. He was inclined to attach little or no importance to the previous history of the case. Of the propriety of performing ovariotomy in well-selected cases, he believed there could be no question. He did not advocate its premature performance, but soon after signs of constitutional suffering appear.

Mr. Brooke related a case occurring at the Westminster Hospital, in which Dr. Bird's method of diagnosis proved successful, and Mr. T. S. Lee mentioned two other cases.

Mr. May spoke of a case in which the compound iodine liniment applied over the abdomen materially decreased the tumor. Dr. Bird would explain the fact by the suggestion that ascites often coexists with ovarian tumor, and the liniment produced an absorption of a part of the ascitic fluid in Mr. May's case.

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[1] Vols. xvi. and xvii.

[2] *London Medical Gazette*, October 20, 1846.

[3] Note to Mr. Hawkins's lecture.

Dr. Murphy inquired as to the experience of Dr. Bird respecting the application of moderate and early pressure to ovarian monocysts. Dr. Bird believed that no degree of pressure exerted any beneficial influence on the tumor.

The question arising as to the statistics of the operation, Dr. Bird stated that we have but a very imperfect knowledge on this point, in consequence of the disgraceful and dishonest suppression of the reports of fatal cases by some operators.[1]

In 1847 Mr. H. E. Burd reported a case (the first of the kind) of ovariotomy successfully performed during pregnancy. The patient aborted two days after operation (at three or four months). She gave birth to a healthy male child seventeen months afterward.[2] In 1847 was also published Mr. T. Safford Lee's work on "Tumors of the Uterus and its Appendages," which gave a most accurate view of the present subject up to that time.

At the meeting of the Westminster Medical Society, October 23, 1847, Dr. F. Bird related a case of double ovariotomy, one of the cysts weighing about twenty pounds, and the other four pounds. Both were adherent to the abdominal walls. This is the second case of intended double ovariotomy on record, and, like the first case (Dr. J. L. Atlee's), was successful.

Mr. Hird made some remarks on the difficulty of diagnosis of ovarian tumors, and doubted if the operation were justifiable, since some patients lived a long time with the disease. He inquired why such large doses of opium were required in this case to produce the desired effect.

Dr. Murphy differed from the previous speaker on both the above points; conceding the erroneous diagnosis in some cases, it was the fault of the operator, and not of the operation. And he thought it most undesirable that the operation should be attempted by those who were not fully qualified for its performance, or who had not, by long previous study, and accurate acquaintance with ovarian disease, become enabled to contend successfully with the dangers and difficulties attending its treatment by extirpation.

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[1] *London Medical Gazette*, November 27, 1846, p. 944.

[2] "Transactions of Medico-Chirurgical Society," vol. xxx., p. 96, and vol. xxxii.

Mr. Hancock expressed his admiration of the successful issue of Dr. Bird's operation, and believed it was unique.

Mr. Streeter also spoke in high terms of the operation, and especially since in a former year he had been opposed to its employment. He also eulogized the after-treatment adopted in this case.

Dr. Bird thought it not necessary to remind Mr. Hird that the exhibition of opium was not to be regulated by any prescribed dose, but by the effect produced, and the effect required. He did not think disease occurs simultaneously in both ovaries in more than three or four per cent. of all the cases. The only case on record, which corresponded with this one, was that occurring to Dr. Atlee, of Pennsylvania, in which the ovaria, enlarged to the size of a goose-egg, were successfully removed.[1]

In 1848 Dr. Charles Clay published a pamphlet, entitled "Results of all the Operations for Diseased Ovaries by the Long Incision." He had now performed ovariotomy thirty-two times, and saved twenty-two of the patients, and had made five exploratory incisions without any ill results.

At the meeting of the Royal Medical and Chirurgical Society, November 12, 1850, Dr. Robert Lee read Mr. E. Duffin's report of his successful case of ovariotomy—the first in which the pedicle was treated by the extra-peritoneal method[2]—and which will be again more particularly referred to. Dr. Lee then laid before the society his statistical table of the operations of ovariotomy which had been performed in Great Britain up to that time. This included seventy-one cases of completed ovariotomy, of which forty-seven recovered and twenty-four died; of thirty-seven cases of unfinished operations, fourteen died. Of these hundred and eight cases, forty-five were reported by Dr. Charles Clay, and eleven by Mr. Lane, who are commended for having communicated the entire results of their experience.[1] In the discussion which followed, the following gentlemen participated :[2]

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[1] *London Medical Gazette*, November 5, 1847, pp. 816–818.

[2] "Medico-Chirurgical Transactions," vol. xxxiv., pp. 10–35.

Mr. Cæsar Hawkins (who had performed a single successful operation, as we have seen, in 1846) had for some time doubted greatly as to the propriety of extirpating diseased ovaries. It was singular that ten hospital surgeons in London had performed ovariotomy, and it afforded a curious comment upon the operation, that not a single one of them had done it a second time. He was himself the only one whose operation proved successful. The valuable paper read that night was complete, with two exceptions. He alluded to Dr. F. Bird and Mr. Walne; he appealed to the former with the more confidence, as, when publishing his early successful cases, he had inveighed against those who kept back their unsuccessful operations, and thus prevented the profession from drawing correct deductions as to the value of the operation.

Dr. F. Bird was surprised that Dr. Lee had not mentioned his cases, since, in his note, he had informed Dr. Lee that he had operated twelve times—eight times successfully and four times with a fatal result.[3]

Dr. Lee said that he had omitted all reference to the cases of Dr. Bird and Mr. Walne, because neither would supply him with such a report as would enable him to complete his analysis, nor give an account of their unfinished operations.

The president (Dr. Addison) inquired of Dr. Bird if cases had not occurred to him in which he could not extract the tumor.

Dr. Bird replied that in some cases our means of diagnosis failed to determine the presence or absence of adhesions, and then he would not hesitate to make an exploratory incision. If adhesions were found, the wound might be closed without any dread of peritoneal inflammation; if there were none, the tumor might be extracted. He had made between forty and fifty exploratory incisions, and no bad results had followed.

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[1] Before Dr. Lee's paper was published, he added fifty-four cases more, thirty-one from the practice of Dr. F. Bird, and six from that of Mr. Walne. Of these, there were one hundred and two ovariotomies, with sixty recoveries; and sixty unfinished operations, with forty-one recoveries.

[2] *London Medical Times*, November 16, 1850, pp. 551–553.

[3] Most of the thirty-one cases assigned to Dr. Bird (note, *ut supra*) were merely explorative incisions.

Mr. Hawkins would again urge on Dr. Bird and Mr. Walne to make known every particular, respecting their operations, to Dr. Lee, to aid him to elucidate all the points of the operation. He then read the passage by Dr. Bird, in the report of his third case, condemnatory of concealment in these cases. The profession would not consider his exploratory incisions justifiable, unless he made known the details of his cases.

Mr. B. Phillips (who had operated unsuccessfully in 1840), in energetic language, condemned the conduct of those who content themselves with publishing their successful cases, leaving the unsuccessful ones in obscurity. The forty or fifty exploratory incisions, unwillingly mentioned by Dr. Bird, were, beyond all doubt, instances of operations commenced, but not completed, on account of attendant difficulties. He thought that a simple non-adherent cyst might be removed by extirpation.

Mr. Hawkins would not admit that the operation was admissible for simple serous cyst of the broad ligament. Tapping alone may prove sufficient, as the fluid re-collects irregularly after being thus evacuated.

Dr. Tilt did not think the operation admissible in the chronic cases in advanced life after the cessation of the menses. In young women it may sometimes be had recourse to.

Mr. Lawrence had never seen or performed this operation, and, unless he greatly changed his opinion, he never should. . . The tables furnished by Dr. Lee were quite sufficient to place ovariotomy out of the list of recognized surgical operations.

The editor of the *London Medical Times* (November 16, 1843, p. 516) terms the above an "instructive discussion, because, thanks to Dr. Lee, it called forth strong expressions of disapprobation from the Fellows, and afforded some of the leading surgeons of the metropolis an opportunity of publicly recording their opinions upon the propriety and the safety of the operation. . . . It appears that exploratory cuts, through the abdominal parietes, followed by the introduction of the finger among the convolutions of the intestines, for the purpose of ascertaining the condition of the pelvic viscera, are extremely common with at least one—but we trust with no more than one—practitioner. We do not intend to let this subject drop."

In the following number of the *Medical Times* (November 23, 1850, p. 548) Dr. F. Bird replied to the notice above, by giving his experience up to that time. He had removed thirteen large ovarian tumors, of which nine were successful cases and four unsuccessful. In another case extirpation could not be accomplished, and the patient died. He had also made eighteen exploratory incisions, and in no case with any bad results. The latter were generally only large enough to allow the effect of the diaphragmatic movement to be observed: the thrusting in of the finger among the convolutions of the intestines being but a flight of fancy of the writer whose words had been quoted. "It is scarcely necessary to remark that, if an ovarian cyst be adherent to the parietes, the finger cannot be thrust in among the convolutions of the intestines; or to suggest that the position of those viscera, in cases of ovarian tumor, is not in the pelvis."

Dr. R. Lee, twelve years afterward (1862), published[1] a short supplement to his paper above mentioned, in which he states that he still had reason to suspect that the results of ovariotomy had been so disastrous, in spite of the reported cases, that he had not advised it for the preceding eleven years. I have already made a short quotation from this writer, as showing his animus toward ovariotomy, on page 258.

In 1851–'52, Dr. F. Bird wrote a series of papers in the London *Medical Gazette*,[2] on the "Diagnosis, Treatment, and Pathology of Ovarian Tumors," which are very discriminating and valuable. To the operation, he says, there still remained the opposition of a few "who appear to value themselves upon a perpetual skepticism; upon believing nothing but their own senses; upon calling for demonstration where it cannot possibly be obtained, and sometimes upon holding out against it when it is laid before them; upon inventing arguments against the success of any new undertaking, and, where arguments cannot be found, upon treating it with contempt and ridicule." He speaks of the compiler of the latest tabular list of cases[3] as one "who has neither gathered credit to himself nor conferred instruction upon others, and who must, by the mere force of truth, be ultimately convicted of having wilfully obscured the inquiry he assumed to aid, by a humiliating indulgence in that restless spirit of detraction, that pitiable and feral passion, under whose power 'intabescit videndo successus hominum—suppliciumque suum est,' and which has marred and warped a mind once fitted for better things."

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[1] "Medico-Chirurgical Transactions," vol. xlvi., pp. 21, 22.

[2] For July 19 and August 2, 1851; March 6, July 24, and August 21, 1852.

[3] That of Dr. R. Lee, before the Royal Medical and Chirurgical Society.

He distinguished between the serous cyst of the broad ligament and the ovarian cyst, since the former contains no free albumen in its fluid; and held that it should not be removed, since, if tapped, it does not always again refill. To the occasional occurrence of this class of cases he attributes the apparent and rare success of empirical treatment. He accepted a unilateral enlargement of the abdomen by the tumor, and its position on one side, as a result of adhesions; and stated that an ovarian tumor is always in front of all the other abdominal viscera—even the pregnant uterus to the end of term—except the bladder, which lies in a triangular space between the tumor and the recti muscles. He states the following important diagnostic points: Cysts give fluctuation, solid or semi-solid tumors give impulse; i. e., the pressure by one hand is instantly communicated to the other, while in case of fluctuation an interval of time is perceived. Fluctuation is more decided in ascites in the erect position; in ovarian cyst, in the recumbent posture. In the former, no displacement of the pelvic viscera is observed (at least, none upward), while it is common in ovarian tumor. The integuments of the abdomen retain their natural appearance in the latter; become smooth, tense, and shining, from the same degree of intumescence, in the former.

I have especially quoted Dr. F. Bird's writings on this subject, from 1843 to 1852, since he labored more than any one else to advance our knowledge of the pathology and the diagnosis of ovarian tumors, and because, both in these respects and as an operator, his merits have been to a great extent overlooked by his countrymen.

The effect of the wholesale denunciation of the operation of ovariotomy by the Royal Medical and Chirurgical Society in November, 1850, may be inferred from the fact that, during the next seven years (1851 to 1857 inclusive), there were but thirty-five ovariotomies in England, of which also only fourteen were successful, and twenty-one proved fatal. This statement does not, however, include Dr. Clay's operations, none of which had been reported since 1850. He had operated up to August, 1857, seventy-nine times, and saved fifty-five patients, according to a paper read by him at Edinburgh in that month;[1] a degree of success that, on becoming known generally, must have convinced the most skeptical.

Ovariotomy had, however, again been discussed in the Medico-Chirurgical Society of Edinburgh, in January (?), 1857, and the discussion reported in the *Edinburgh Medical Journal* for February of that year. Prof. Simpson's argument in favor of it was opposed by Dr. J. Matthews Duncan, who also wrote an article entitled "Is Ovariotomy justifiable?" in the *Lancet*, in February, 1857. Prof. Simpson replied somewhat severely to Dr. Duncan in the next number of the *Lancet*, and Dr. Duncan subsequently rejoined in two papers in the same journal.

It was at this crisis in the history of ovariotomy, and in February, 1858, that Mr. T. S. Wells commenced his unprecedented career as an ovariotomist. He had had charge of the Samaritan Hospital, London, before the Crimean War, in which he served as a surgeon, and, resuming his hospital duties after its close, several cases of ovarian disease came, in 1857, under his charge. Impressed by the uselessness of palliative treatment, and the danger of iodine injections, while at the same time ovariotomy had received such a blow in the metropolis from the society just named, he decided in December, 1857, to put the operation to the test of personal experience, pledging himself to make the results fully known to the profession. His first attempt was not encouraging. "Finding intestines in front of the tumor, I was induced," he remarks, "to close the wound without proceeding further, on the representation that the tumor could not be ovarian. The patient recovered well, but died four months afterward from spontaneous rupture of a cyst into the peritoneal cavity, and I had the mortification to find that the tumor might have been easily removed." The following three cases were successful, the first being in February, 1858. The tumor was exhibited at the Pathological Society;

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[1] *The Lancet*, July 24, 1858, p. 101.

the case was fully reported in the *Medical Times*, and more than one writer has traced to that case the commencement of what has been termed on the Continent the revival of ovariotomy in England.[1]

Mr. Wells read a paper upon his first five operations (four of them being ovariotomies) before the Royal Medical and Chirurgical Society of London, in February, 1859. This paper had a very great influence upon the opinion of the profession in England and elsewhere, and especially in London, where all opposition to the operation was soon afterward silenced, and by 1860 ovariotomy was adopted throughout England. The principal points of this paper are the following:

1. The incision should not be unnecessarily long, and the fluid of the cyst should not be allowed to enter the peritoneal cavity.

2. The pedicle should be cut far from the ligature, to prevent the latter from slipping, and the free end of the pedicle should be brought outside of the cavity of the abdomen.

3. In closing the incisions, the sutures should include the peritonæum.

4. Good ventilation, cleanliness, quiet, and the best nursing possible, are necessary to success, which conditions cannot be secured in the general wards of large hospitals.

Mr. J. Hutchinson performed his first two ovariotomies, both successful, in April and August, 1858.[2] To him the introduction of the clamp for fixing the pedicle externally is due.

In 1859, Mr. Wells read another paper before the Medico-Chirurgical Society, reporting three cases of tetanus occurring in his practice within one month, and two of them after ovariotomy.

In 1860, Dr. J. Clay, of Birmingham, published his translation of Kiwisch's lectures on "Diseases of the Ovaries," and appended a statistical table including all the ovariotomies attempted and completed up to that time. Its influence in Great Britain and on the Continent in favor of ovariotomy was very great.

In 1862, Mr. I. B. Brown published his work on "Ovarian

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[1] "Medico-Chirurgical Transactions," vol. xlvi., p. 43.

[2] *Medical Times and Gazette*, July 17 and October 23, 1858.

Dropsy," the only one up to this time in the English language. A second edition published in 1868 contained his own cases up to that time, viz., one hundred and eleven in all, of which seventy-six recovered and thirty-five died. He, however, lost but eight cases out of the last forty-nine.

It was at the meeting of the Royal Medical and Chirurgical Society, November 22, 1862, that Dr. Robert Lee read the supplement, referred to on page 293, to his statistical table presented November 12, 1850 (p. 290). A remarkable discussion ensued, from which quotations have been made on page 258.

The following contributions are from Mr. Wells since 1860. Those of Dr. Tyler Smith, Mr. Bryant, and others, and other statistical papers, will be referred to farther on.

In December, 1862, Mr. Wells read before the Medical and Chirurgical Society[1] a paper on the "History and Progress of Ovariotomy in Great Britain," and from which I derive the facts before stated which are personal to himself. To this paper he appended a table of his first fifty cases of ovariotomy, besides three in which ovariotomy was not completed, and three cases in which an exploratory incision was made. He also mentions another case in which, being doubtful as to the diagnosis, he found, on opening the abdominal cavity, a uterine fibroid, and removed it. His statistics will be referred to hereafter. In this paper he gives the rule that "the better the general health of the patient, and the smaller the injury done to any diseased part, the greater is the probability of success," and insists on keeping the room of the patient cool, and well ventilated, besides the avoidance of large doses of opium, unless necessary to control pain. After speaking of the present perfect health of the patients he had cured by the operation, he closes with an appeal to the Fellows of the Society to determine whether an operation which has led to such results is still to be stigmatized as unjustifiable.

Mr. Wells gave to the Medical and Chirurgical Society a second series of fifty cases of ovariotomy, with remarks on the selection of cases for the operation;[2] and a third and fourth series of fifty cases, with remarks on the situation and length of incision required in ovariotomy, in 1867. His third series of one hundred cases he presented in 1869, and his fourth series of one hundred cases was published in 1871.[1] I shall frequently have occasion to refer to these and still other papers in the following chapters. He published the first volume of his cases of ovariotomy in 1865.

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[1] "Medico-Chirurgical Transactions," vol. xlvi., pp. 43–46.

[2] Ibid., vol. xlviii., p. 215.

I should, however, add that the operation was vehemently denounced by several of the physicians of London, especially by Drs. H. Davis, Savage, Chas. West, and Dr. Robert Lee. These opponents were answered by Prof. Simpson in his lectures on the "Diseases of Women." Most of the surgeons of London also at first denounced it, and especially Mr. Liston, whose language I have already quoted. Since 1860, however, Dr. Davis and Dr. West have been among the stanchest advocates of the operation; and Mr. Fergusson has expressed himself as follows:[2] "My personal experience in the operation last referred to has been comparatively limited; yet, though prejudiced against it in my early education, I now feel bound to state that the removal of such formidable disease by one or other of the various proceedings at first executed in this country by Mr. Lizars, and now practised by Dr. Clay, Dr. Bird, Mr. I. B. Brown, Mr. Walne, and others, is not only justifiable, but in reality, in happily-selected cases, an admirable proceeding."

Of several papers on ovariotomy which have been published in the Transactions of the Obstetrical Society of London since its foundation in 1859, only the titles can here be given:

1. "Ovariotomy; with Cases, and Remarks on the Different Steps of the Operation, and the Causes of its Mortality," by W. Tyler Smith, M. D., F. R. C. P., vol. iii. (1861), p. 41.

2. "On Ovariotomy; the Mode of its Performance, and the Results attained at the London Surgical Home," by I. Baker Brown, F. R. C. S., vol. iv. (1862), p. 59.

3. "Observations on Ovariotomy, Statistical and Practical," etc., by Charles Clay, M. D., Manchester, vol. v. (1864), pp. 53–66.

4. "On some Cases of Ovariotomy, with Remarks," by Thomas Bryant, F. R. C. S., vol. vi. (1865), pp. 35–60. Mr.

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[1] "Medico-Chirurgical Transactions," vols. l., lii., and liv.

[2] "A System of Practical Surgery," 3d edition, p. 792.

Bryant also, in 1867, published a very valuable pamphlet containing the statistics of nine hundred completed ovariotomies, and from which he deduces several important practical conclusions.

5. "On a New Method of securing the Pedicle in Ovariotomy," by I. B. Brown, Esq., F. R. C. S., vol. vii. (1866), p. 28.

SECTION IV.

OVARIOTOMY IN FRANCE.

We have seen that Delaporte was the first in France to propose ovariotomy, in 1774, and that his ideas were defended before the Royal Academy of Surgery, by Morand; but the memoir of M. Hévin opposed the views of Morand, and the operation was not again seriously proposed till 1798, by Chambon (p. 234).

Nothing favorable to ovariotomy was published in France, excepting the thesis by Samuel Hartmann d'Escher, in 1808, up to the year 1844. Sabatier had opposed the operation by every imaginable argument.[1] Boyer considered its feasibility an illusion, and says: "The least reflection suffices to show the danger and the impossibility of this operation, which has not been practised, and probably never will be."[2] Thus Chambon and an undergraduate of Montpellier were the only individuals since Morand who had dared commend it. Velpeau, indeed, in 1840, advises extirpation of an ovarian cyst in well-determined cases, i. e., when the tumor is movable, is not adherent to any part or organ, and has a slender pedicle.[3] But he reconsidered all this seven years afterward.

In July, 1844, M. A. Chereau published a memoir,[4] in which he reported sixty-five operations, of which forty-two were successful. It, however, had no influence in diminishing the denunciations of ovariotomy by the profession at large.

The first operation of ovariotomy in France was performed

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[1] "Médecine Operatoire," Éd. Dupuytren, vol. ii., p. 503.

[2] "Maladies Chirurgicales," vol. viii., p. 458.

[3] "Traité de Médecine Operatoire," tome iv., p. 24. Dictionnaire en trente volumes, tome xxii., Article, Ovaire, p. 594.

[4] *Journal des Connaissances Medico-Chirurgicales*, Juillet, 1844.

April 29, 1844, by Dr. Woyerkowsky, of Quingez (Doubs). It was a case of ovarian cyst, weighing about seven pounds, complicated with ascites. The patient was cured in twenty-five days, and afterward had two children.[1] The same year M. Rigaud, of Strasbourg, attempted ovariotomy, but did not remove the tumor, apparently from mere timidity, and the woman died of peritonitis on the fourth day.[2]

On September 15, 1847, the second operation of ovariotomy in France was performed by M. Vaullégeard, of Condé-sur-Noireau (Calvados). The patient, a young woman twenty-five years old, had an ovarian tumor weighing eighteen pounds, complicated with ascites, and in three years had been tapped fifty-two times for the ascites, each tapping affording from fifty to sixty pounds of fluid. She had recovered twenty-five days after the operation.[3] It was in this year that Velpeau pronounced against ovariotomy, regarding it as an indication of foolishness and an act of madness.[4] In 1848, Maisonneuve performed ovariotomy at the Hôpital Cochin. The patient died twenty-two hours after the operation.[5] Thus ovariotomy had been performed but three times in France before 1850, though twice with success. In 1852, M. Back, of Strasbourg, unsuccessfully performed ovariotomy.[6] Jobert (de Lamballe) did the same in 1856.[7]

This record brings us to the winter of 1856–'57, rendered famous in the annals of ovariotomy, especially for France and Germany, as has been seen (p. 256), by the renowned discussion upon this operation by the Academy of Medicine of Paris.

Up to this time ovariotomy had been completed but four times in France—twice successfully and twice unsuccessfully. It had been attempted by M. Rigaud, of Strasbourg, but not completed, though the autopsy showed every thing to have been most favorable for a success. Everybody seemed, however, to have forgotten the successes of Woyerkowsky and Vaullégeard, though achieved only twelve years before, and no allusion was made to them in the discussion by the Academy.

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[1] *Journal de Médecine et de Chirurgie Pratique*, Paris, 1847.

[2] *Gazette Médicale de Strasbourg*, 1852.

[3] *Journal des Connaissances Medico-Chirurgicales*, Juin, 1848.

[4] *Gazette des Hôpitaux*, No. 99, 1847.

[5] "Bulletin de la Société de Chirurgie," tome ii., 1849.

[6] *Gazette Médicale de Strasbourg*, 1852, p. 424.

[7] *Bulletin de l'Académie de Médecine*, 1856, No. 18, tome xxii., p. 142.

Meantime, in this country the operation had been performed, up to the close of 1856, ninety-seven times, and fifty-four times successfully; in England, one hundred and twenty-three times, with seventy-one recoveries; and in Germany, forty-seven times, with but thirteen cures and thirty-four deaths. Dr. Clay, of Manchester, had had forty cases of completed ovariotomy, and had saved twenty-seven of his patients.

In these circumstances it is not at first easy to account for the opposition, and even the virulence, manifested so generally by the members of the French Academy of Medicine against this operation. The discussion on ovarian cysts and their treatment was commenced in October, 1856, and continued till the next February;[1] and the following members, half of them eminent surgeons, participated in it: Velpeau, Cruveilhier, Cloquet, Jobert (de Lamballe), Malgaigne, Huguier, Guerin, Gimelle, Trousseau, Piorry, Moreau, Robert, Barth, and Cazeaux. With a single exception, all these gentlemen condemned ovariotomy as a rash, unjustifiable procedure. I will quote from several of the surgeons just mentioned;[2] merely premising that Piorry, a physician, admitted that "in certain circumstances we might attempt the excision of ovarian tumors; but to do this one must possess an American audacity" (*une audace Americaine*).

Malgaigne.—"A great deal has been said in America and in France respecting the extirpation of ovarian cysts; an operation too radical, as it seems to me, and of a nature to place patients too absolutely beyond all resource. . . . The alleged statistics prove nothing. All know what statistics are worth when all the successes are collected, and the reverses are omitted."

Cruveilhier.—"There is no curative treatment for multilocular cysts, for there can be but one method of cure, and that by extirpation. And although this operation may be invited to some degree, by the isolation of the cyst, the perfect integrity of the surrounding organs, and the facility of the operative procedure, although it has been performed quite a large number of times with success, especially in England and in America, I do not think that this daring operation should be allowed a citizenship in France.[1] Success does not always justify rash proceedings."

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[1] Reported in the *Bulletin de l'Académie Impériale* from October, 1856, to February, 1857.

[2] Sessions of November 6, 13, and 20, 1856. *Bulletin de l'Académie Impériale*, tome xxii., p. 25.

Huguier.—"In spite of the statistics, we reject it in a manner almost absolute."[2]

Jobert (de Lamballe).—"Extirpation is a very dangerous operation, which should very rarely be resorted to."[3]

Velpeau.—"The extirpation of diseased ovaries is a frightful operation, which ought to be proscribed, even though the cures announced were real."[4]

Moreau.—"For myself, I think this operation should be placed among the prerogatives of the executioner."[5]

Eminent as all these speakers were, as mere surgeons, they were scarcely qualified to decide the question before them at all, and certainly not without the most careful examination. Malgaigne's invidious accusation was not sustained by the facts; while the conclusions of Cruveilhier were inconsistent with his own admissions respecting the success of the operation and the absolute inefficiency of every other mode of treatment. "A single one, however, of the participants in that discussion had a special right to speak with authority on that subject. His special studies and his constant acquaintance in practice with the nature and progress of ovarian tumors qualified him to hold an intelligent opinion on this subject. I allude to the distinguished surgeon-accoucheur Cazeaux, whose voice alone was raised in defence of the operation,[6] and who closed his remarks as follows: "Finally, is there nothing better to be done in these unfortunate cases than to abandon patients to a certain death? . . . I will only touch upon this question, for I know that my answer will meet with but little sympathy in this circle, and that, to justify it, I should be obliged to speak too much at length. But I will not leave this stand without protesting against the anathema hurled by several speakers against extirpation of the ovaries. . . . I believe that, before proscribing, we should examine, and that a sufficiently serious examination has not yet been made. . . . Reserved for multilocular and areolar cysts, for those whose fluid is albuminous or gelatinous, I do not hesitate to declare my conviction that the operation is fully justifiable.

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[1] *Bulletin de l'Académie Impériale*, tome xxii., p. 90.

[2] Ibid., p. 113.

[3] Ibid., p. 154. His unsuccessful case was reported in the Bulletin ten pages before these remarks.

[4] Ibid., p. 220.

[5] Ibid., p. 226.

[6] "Monograph on Ovariotomy," p. 45

"Do not forget," he added, "that I speak of an ovarian cyst, and one of the worst kind; that when these malign tumors have acquired a large size they kill in a very short time, and that, before killing, they produce such sufferings that, to many of these unfortunates, death seems preferable to life. Now, in these circumstances, an operation is proposed which has already had numerous successes, and you reject it with disdain. Well, I assert that your indignation is not legitimate, and that you have no right not to instruct families as to the resources it affords to patients suffering thus. Every day surgeons are performing operations quite as grave, for diseases whose symptoms are not more pressing."[1]

If I add that this opinion was at the time worth more than all the others expressed, the grounds of such an assertion have already been given. It was but a repetition of the experience of the first reports of cases of ovariotomy by Dr. McDowell. When they reached Philadelphia, Dr. Physic, the great surgeon of that time, would not deign to notice the cases, or justify the operation. But Dr. James, the Professor of Obstetrics in the University of Pennsylvania, at once perceived the great advance made by this operation, and published the report in a journal of which he was one of the editors.[2] Dr. J. Blundell befriended Dr. Clay and the operation from the first. It is also a pertinent fact in this connection, that not a single member of the Obstetrical Society of London has raised an objection to the principle of ovariotomy; though several of them were for years opposed to it (among them, Dr. Hall Davis, Dr. West, Dr. Savage, and Dr. W. Tyler Smith), until they became acquainted with the facts.[3]

In contrast with their French *confrères*, the English provincial surgeons early accepted the operation of ovariotomy, as we have seen; though those of the metropolis generally remained indifferent rather than decidedly opposed to it. Those, however, who took part in the discussion before the Royal Medical and Chirurgical Society, in December, 1850, were only more mild and rational, but not less decided, in their opposition to ovariotomy than the surgeons of Paris, just named. But within six years after the discussion in Paris, and twelve years subsequently to that of the Medical and Chirurgical Society, the opposition of the London Surgeons had ceased. In 1863, Mr. Cæsar Hawkins, who had once operated himself, and had afterward opposed the operation, stated that, "with the exception of those who had made this class of disease a specialty, not three of the leading surgeons of London have said any thing for or against this operation."[1] The reason for this, as stated by Mr. Curling, that "hospital surgeons can speak only from a limited experience," had certainly not influenced the expressions of the Faculty of Paris, in 1857.

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[1] *Loc. cit.*, p. 181.

[2] *Eclectic Repertory*, 1817.

[3] "Monograph," p. 45.

It is not surprising that the wholesale denunciation of ovariotomy which I have quoted, from the highest and most influential medical tribunal in France, should have checked its progress; and thus we find that for the next five years, or up to the commencement of 1862, only three more attempts at ovariotomy were made in that country. These were by Hergott and Michel, in November, 1858;[2] Boinet, in February, 1859;[3] and Richard, in April, 1861.[4] All of these were fatal cases.

A writer in the *London Medical Times and Gazette*[5] remarks, in regard to the action of the profession generally in France at this time, and of the surgeons of London a few years before, that "we need not say much, however, for never did operation meet with more opponents than did this in our own country; and it is a notable instance of what individual perseverance may do in forcing benefits on unwilling recipients."

In 1856, M. Cl. Bernard published a paper in the "*Archives Générales de Médecine*,"[6] which took a more encouraging view than the Academy expressed; and the denunciations of the latter were in a degree neutralized by the appearance, in 1860, of M. Jules Worms's memoir, soon again to be referred to. Thus some of the younger surgeons at least were induced to reconsider their former opinions; and, in the autumn of 1861, Nélaton visited London in order to witness the operations of T. S. Wells and I. B. Brown, and gave special attention to the mode of operating and the after-treatment. He returned full of enthusiasm, and on the 25th of October gave a lecture, at the Hôpital des Cliniques, on the five operations he had seen performed by the latter. He made an energetic appeal to the surgeons present, and urged them to lay aside the exaggerated fears of this operation[1] which they had before entertained.

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[1] *The Lancet*, June, 1863, pp. 340, 528.

[2] *Gazette Médicale de Strasbourg*, 1859.

[3] *Gazette des Hôpitaux*, 1859, p. 571.

[4] *Gazette Hebdomadaire*, 1862, p. 531.

[5] September 3, 1865, p. 260.

[6] Octobre, 1858.

The combined effects of the two causes just mentioned now became apparent in the increased number of operations. Demarquay operated in February, 1862; but the patient died three days afterward. Fourteen other operations followed in the same year, of which eight were successful. Kœberlé, of Strasbourg, whose first operation was on June 2, 1862, performed four operations; Nélaton, three, the first being on June 17, 1862;[2] A. Richard, two; and Demarquay, Parisse (de Lille), Desgranges, Boinet, and Maisonneuve, one each.

In 1863 twenty operations were performed in France; nine of these by beginners, viz., Valette (de Lyon), Landouzy, Lutton, Daviers (d'Angers), Huguier, Cusco, Gosselin, Regnault (de Rennes), and Lacroix (de Béziers). Of these, only five succeeded. Up to December, 1863, there had been but twenty-six ovariotomies in France, of which only twelve were successful (46.15 per cent.).

Thirteen operations were performed in 1864, of which nine succeeded. The new operators were Serre (d'Alais), Berrut (de Marseille), and Péan, who had his first operation in November of this year. The year 1865 gives twenty-one operations, and twelve successes; and the beginners this year were Gayet (de Lyon), Richet, Leroux (de Versailles), Labbé (Léon), Courty (de Montpellier), Sims, and Aubrée (de Rennes). Eleven cases are reported for 1866, and only five recovered. The first operations were performed by Dolbeau, Desprès, and Dubarry. During the first three months of the year 1867, ovariotomy was performed five times in France, with but two successful results. The first operations were performed by Giraldes and Closmadeuc.

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[1] Boinet, pp. 308–310.

[2] All went on well with this case till the fourteenth day; but in the third week death ensued from tetanus. M. Duchambre remarks of it in the *Gazette Hebdomadaire*, "The patient of M. Nélaton died cured."

Here ends the list afforded by the table of Boinet (pp. 326–330). His summary for France up to March 31, 1867, gives one hundred and twenty-two operations of ovariotomy, and forty-nine recoveries, with seventy-three deaths.

Rejecting, as we should, Laumonier's case, Rigaud's case (unfinished), Boinet's first case (degenerated fibroid), Kœberlé's case of uterine fibroma, Boinet's case of uterine fibroid, in 1865, and Maisonneuve's case (unfinished), 1866—we have one hundred and sixteen reported cases, with forty-seven recoveries and sixty-nine deaths, for France, up to April 1, 1867.

Up to July, 1868, M. Péan reported that of his last ten operations, all of them difficult cases, seven had recovered and three died. Two of the patients who died were seventy years old.[1] During 1870 and 1871 he had thirty-two operations, and twenty-six recoveries.[2] In August, 1868,[3] Kœberlé had operated sixty-nine times, with forty-three successes and twenty-one deaths. He has, therefore, achieved for France a success of 66.67 per cent. against 46.15 per cent. at the end of 1863.

Not less than one hundred and ninety ovariotomies had been performed in France up to the commencement of 1870, and all but seven of them, as we have seen, since the commencement of 1862. The causes of the bad success of this operation in France will be considered in a subsequent chapter.

From the preceding sketch, we are not to expect that the *literature* of our present subject has been cumulative in France, till since 1860. I have alluded to the ideas of Delaporte, Hévin, and Chambon, in the last century, and now refer more particularly to other authors, some of whom have been already mentioned.

M. Corbin wrote on this subject in the *Gazette Médicale de Paris*, tome i., 1830. M. Cazeaux presented his thesis in 1844. In July, 1844, M. A. Chereau published his memoir in the *Journal des Connaissances Medico-Chirurgicales*, collating sixty-five cases of ovariotomy from all sources, of which forty-two were successful. His "Esquisse Historique de l'Ovariotomie" appeared in the *Union Médicale*, for October, 1847. The thesis of M. Cazeaux was published in 1844 (Paris); that of M. Maisonneuve in 1850; and of M. Desormeaux in 1853.

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[1] *American Journal of Medical Sciences*, July, 1868.

[2] *Medical Press and Gazette*, December 2, 1871.

[3] *Gazette Hebdomadaire*, No. 32, 1868, p. 498.

M. Cl. Bernard's paper, already referred to, appeared in the *Archives Générales de Médecine*, in October, 1856. In the winter of 1856–'57, occurred the famous discussion in the French Academy of Medicine (p. 301). M. Bauchet presented his memoir to the Academy of Medicine in 1858.

In 1860 the memoir of M. Jules Worms "Sur l'Extirpation des Tumeurs cystiques de l'Ovaire," appeared in the *Gazette Hebdomadaire de Médecine et de Chirurgie* (pp. 642, 658, 690, 741, 804). Being equally familiar with the French, German, and English languages, a good observer, and a highly-educated physician, M. Worms conscientiously applied himself to the inquiry respecting the actual results which had been achieved by ovariotomy, especially in England, and after much labor he arrived at the conclusion that ovariotomy is a valuable surgical resource, and that it would doubtless, at some day, save many lives in France. In this year, also, M. Boinet published his "Iodothérapie," in which he gave his experience up to that time in the treatment of ovarian cysts by iodine-injections.

The following contributions to the subject of ovariotomy appeared in France in 1862: Ollier, *Gazette Médicale de Lyon;* Pihan-Dufeillay, *Archives Générales de Médecine;* Gentilhomme, *Gazette Médicale de Paris;* Labalbarie, "De l'hydrovarie," Paris; Léon Le Fort, *Gazette Hebdomadaire.*

During 1863, M. Courty, of Montpellier, published his "Excursion Chirurgicale en Angleterre," and Gaillardot his "Thèse de Paris." The Thesis of Raphael Herrera Vegas, "Sur les Kystes de l'Ovaire et l'Ovariotomie," was published in 1864. It is a quarto of one hundred and ninety-eight pages, and gives a very clear and satisfactory view of the whole subject up to that time, the author having himself witnessed the practice of Mr. T. S. Wells and I. B. Brown.

Kœberlé, of Strasbourg, who commenced his career as an ovariotomist in 1862, published his paper "De l'Ovariotomie," and reported his first twelve cases, with nine successes, in 1865;

and to him more than to any other French surgeon the general adoption of ovariotomy in France by the year 1865 is due. He, of all the surgeons of that country, has the most carefully and conscientiously weighed and thought out all the points of the diagnosis, and of the operation of ovariotomy itself. He does not, and need not, hesitate to claim some considerable credit for himself. "Denounced for a long time," says he, of ovariotomy, "it has, nevertheless, ended by establishing itself gradually in France since the impulse given by my operations."[1] This paper, and his report of his first sixty-nine cases in the *Gazette Hebdomadaire de Médecine et de Chirurgie* for August, 1868, will be referred to in subsequent pages.

A reviewer of M. Kœberlé's statistics, in the *Edinburgh Medical Journal*, October, 1868, remarks that he indulges in "a license in comparison of himself with others, and in boastful sentiments, which we think somewhat unbecoming as well as unfounded. M. Kœberlé has cooked his own and Mr. Wells's statistics so as to show himself to be superior to Wells. But Kœberlé lost twenty-four patients in sixty-nine operations; Wells lost twenty-eight in his second one hundred operations; and Dr. Keith, fourteen in sixty-five: Kœberlé one in $2\frac{7}{8}$, Wells, one in $3\frac{4}{7}$; and Keith, one in five. No ingenuity can get over this hard and dry statement. . . . Kœberlé may be, as himself thinks, the best ovariotomist in the world. We have only shown that he has not afforded the world grounds sufficient to establish a conclusion so unlikely, so unexpected, and, so far as we can see, so unfair to his contemporaries in London and Edinburgh" (p. 356).

Among his compatriots, however, M. Kœberlé had not overestimated his own merits.

In 1866, M. Negroni published his "Aperçu de l'Ovariotomie;" and M. Caternault, his "Essai sur la Gastrotomie;" each of them a "Thèse de Paris."

In 1867, Boinet published his "Traité pratique des Maladies des Ovaires et de l'Ovariotomie," the first complete work on the subject in the French language, and which I have already frequently referred to.

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[1] "Opérations d'Ovariotomie," 1865.

SECTION V.

OVARIOTOMY IN GERMANY.

Whether the report of Dr. McDowell's first three cases of ovariotomy, published in 1817 as we have seen, had been read by any of our German *confrères*, does not appear; but it is certain that, in less than two years thereafter (in May, 1819), Dr. Chrysmar, of Isny, Würtemberg, performed this operation for the first time in Europe,[1] and six years before the first attempt of M. Lizars. Dr. Chrysmar also repeated the operation twice more before the end of the year 1820. The first operation was unsuccessful. The second, in 1820, was performed in fifteen minutes; the patient recovered, and two years afterward had a child at full term. The third case (1820) was unsuccessful.[2]

Dutoit [3] remarks that the history of ovariotomy in Germany presents only a series of *membra disjecta*, rendering it very difficult to give an exact account of its development in that country. This is not, however, because the medical profession there have entertained a bitter aversion to it, as in France, but because most German surgeons were afraid of such dangerous interference. Only single cases are here and there to be found, therefore, in literature; and from the first case above mentioned in 1819 to 1856—thirty-seven years—there had been but sixty-four operations, with only eighteen recoveries and forty-six deaths. Dutoit considers the operations of Langenbeck and Kiwisch, amounting to but eleven in all, as being the only ones to be relied upon up to 1864, even for the formation of an opinion.

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[1] The three operations of Dr. Chrysmar were reported not by himself, but by Dr. Hopfer, of Biberach, who assisted him in their performance, and who states that Chrysmar told him he had previously operated twice, and once successfully. Dr. Hopfer claims that Dr. Chrysmar was the first German surgeon who ever performed ovariotomy, but does not state that the idea was original with him. He ends his report of the cases with a brief biographical sketch of Dr. Chrysmar, who died in 1821, at the age of forty-seven years; from which it appears that he was fully competent to carry into practice the idea of the extirpation of ovarian cysts so often suggested before, as I have shown.

Dr. Chrysmar was born in Wurzach, in 1774, of indigent parents, but at an early age manifested great intellect and mastered the Latin and the German languages. At the age of sixteen he went to Vienna as a surgical assistant, and devoted all his spare time to attendance on surgical lectures at the Joseph's Institute. He was also much interested in anatomy. At last, through great economy, he was able to matriculate at the university; and after graduation he settled as surgeon and accoucheur at Constance, whence he was soon called to Isny, Würtemberg, where he rapidly acquired a high reputation as a surgeon. He read much and studied every new surgical work, and travelled extensively. He had a private institute for treating his patients, and was greatly respected as a man and a physician. He was requested by Dr. von Klein, in 1820, to publish his manifold operations, but was prevented in 1821, by his sudden death in his forty-seventh year, from "gout on the lungs." Journal für Chirurgie und Augenheilkunde. Herausgegeben von Dr. von Gräfe und Dr. P. F. von Walther. Zwölfter Band. Erstes Heft, pp. 60–87. Ibid., pp. 85–87.

[2] *Bulletin de Ferussac*, tome xviii., p. 86, and *Journal der Chir. und Augenheilkunde*, B. xii., p. 62.

[3] "Die Ovariotomie in England, Deutschland und Frankreisch," Würzburg, 1864, pp. 4, 5.

The still smaller, but, in an historical point of view, somewhat fuller *brochure* of Fehr[1] is scarcely more available for our present purpose; and I derive many of the facts which follow from Grenser's work,[2] published at Leipsic in 1870.

The operation of ovariotomy was attempted by Dieffenbach, of Berlin, in 1828, but not finished.[3] His patient, however, recovered. He remarks (p. 9), that "whoever considers the opening of the abdominal cavity a small affair, and who, like Lizars, seems to believe that one may look on when such a calamity happens, and that this is connected with as little danger as any other operation, seems to be the one least called upon to undertake the same. I have already had quite enough of this one case." Twenty years afterward he still regarded the idea of the operation as neither reasonable nor useful; though he was then disposed to qualify this opinion somewhat, provided the tumor were fluid, small, and movable.

In 1832 ovariotomy was performed by Ritter,[4] for the fourth time in Germany, this being the second successful operation. In 1834, K. Fr. Quittenbaum, of Rostock, operated successfully, and Groth, of Bornhövd, unsuccessfully.[5] Dohlhoff, of Magdeburg, operated in 1836;[6] Stilling, of Kassel, in 1837;[7]

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[1] "Die Ovariotomie. Geschichtlich und Kritisch bearbeitet," Heidelberg, 1864.

[2] "Die Ovariotomie in Deutschland. Historisch and kritisch dargestellt," Leipzig, 1870.

[3] Rust's "Magazine," B. xxv., p. 349.

[4] Kiwisch's tabelle.

[5] Pfaff, N. F. I. 12, 45.

[6] Rust's "Mag.," B. li., p. 77.

[7] Schmidt's "Jahrb.," B. xxxviii, p. 59.

Schott, of Frankfurt,[1] in 1838; and Hayny,[2] of Jungbunzlau, in 1841. All these operations were unsuccessful. In 1842 Quittenbaum[3] again operated successfully; and Bühring, of Berlin, unsuccessfully in 1843.[4] Kiwisch, of Würzburg,[5] had his first operation (a failure) in 1844. In 1846 Siebold, of Darmstadt,[6] operated successfully; and Heyfelder, of Erlangen, had a failure.[7] All the operations in 1847 were unsuccessful. They were by Kiwisch, Mogk, of Offenbach,[8] Küchenmeister, and Steinert, of Zittau,[9] and Langenbeck, of Berlin.[10] The latter, in 1848, failed again,[11] and Stilling succeeded.[12] Knorre, of Hamburg, had a successful operation in 1849;[13] and Ed. Martin, of Jena, also had his first case (a failure) that year.[14]

Thus it appears that, previously to 1850, ovariotomy had been performed twenty-three times in Germany; seven times successfully, and sixteen times unsuccessfully. Unfinished operations had also been made by Bühring,[15] Kiwisch,[16] Dohlhoff,[17] Hayny, Rothmund, of Munich,[18] and Wernher, of Giessen.[19]

During the next fourteen years (1850–'63 inclusive), ovariotomy was successfully performed in Germany but eight times, by Kiwisch,[20] and Krauel, of Rostock[21] (1850); Ed. Martin,[22] and Langenbeck[23] (1851); Langenbeck[24] (1852); Bardeleben,[25] of Greifswald (1856 and 1858); and Nussbaum[26] (1863). During this period the unsuccessful cases were twenty-four in number, as shown by the table on the following page, which gives the name of the operator, the year of the operation, and the sources whence they have been obtained.

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[1] Simon's tabelle.

[2] Schmidt's "Jahrb.," B. xlviii., p. 308.

[3] Dissert. v. Al. Quittenbaum, 1850.

[4] Bühring's work, p. 33.

[5] Kiwisch's tabelle.

[6] Simon's tabelle.

[7] Schmidt's "Jahrb.," 1848.

[8], [9] Simon's tabelle.

[10], [11] Fock's tabelle.

[12] Schmidt's "Jahrb.," B. lxiv., p. 323.

[13] "Deutsche Klinik," 1849, viii., 5.

[14] Martin's work.

[15] Bühring's work.

[16] Ulsamer's dissertation, Wurtzburg, 1851.

[17] Rust's "Mag.," B. li., p. 57.

[18], [19] Simon's tabelle.

[20] Prager Fierteljahrschrift, 1851, B. I.

[21] Dissert. v. A. Muller, 1857.

[22] Martin, *loc. cit.*, pp. 18–95.

[23] "Deutsche Klinik," 1851, p. 223.

[24] "Deutsche Klinik," 1853, p. 42.

[25] Dissert. v. Mehlhose, u. Bardeleben, Lehrbuch d. Chirurg., B. iv., 551 Anm.

[26] Dutoit's tabelle.

	OPERATORS.	WHERE REPORTED.
1850.	Wattmann (Vienna)	Simon's tabelle.
1850.	Knorre (three cases)	" "
1851.	Langenbeck (three cases)	Fock's tabelle, und Busch, p. 168.
1851.	Baum (Göttingen)	Simon's tabelle.
1852.	Strempel (Rostock)	Dissert. v. A. Muller, 1857, Rostock.
1852.	Bartscher (Osnabrück)	"Deutsche Klinik," 1853, p. 360.
1852.	Bardeleben (Greifswald)	Dissert. v. Jacob, Greifswald, 1856.
1852.	Wild (Kassel)	Simon's tabelle.
1852.	Scanzoni (Würzburg)	*Beitrage zur Geburtskunde*, 1856, I.
1853.	Bruns (Tübingen)	Steudel, *loc. cit.*, 1856.
1854.	Roser (Marburg)	Simon's tabelle.
1856.	Janson (Frankfurt a. M.)	" "
1856.	Schuh (Vienna)	Schmidt's "Jahrb.," 1856, Nr. 8.
1856.	Baum (Göttingen)	Simon's tabelle.
1857.	Thiersch (Erlangen)	Dutoit's tabelle.
1860.	Benno Schmidt (Leipzig)	*Monatsschr. für Geburtsh. u. Frauenkr.*, August, 1862.
1860.	Thiersch	Dutoit's tabelle.
1862.	Neudorfer (Prague)	" "
1863.	Freund (Breslau)	" "
1863.	Nussbaum (Munich)	" "

Thus, up to the last quarter of 1863, there had been fifty-five ovariotomies in Germany, fifteen cures and forty deaths; or only 27.27 per cent. of successes.

Since the commencement of 1864, the number of ovariotomies in Germany, up to 1870,[1] is one hundred and twenty-five, of which sixty resulted in cure, and sixty-five in death.

These one hundred and twenty-five operations were performed mainly by the following operators: Nussbaum, 32; Spiegelberg (Breslau), 14; Stilling, 15; Veit (Bonn),[2] 5; Simon (Rostock), 5; Wagner (Dantzig), 4; Thiersch, 2; Breslau (Zurich), 3; Scanzoni, 2; E. Martin (Berlin), 3.

Thus the whole number of ovariotomies in Germany, up to the commencement of 1870, is (55+125) 180; of which (15+60) 75 resulted in a cure, and (40+65) 105 were fatal. The recoveries are, therefore, only 41.66 per cent.

Including only the operations of the three most experienced operators, the following is the result:

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[1] Grenser, p. 77.

[2] He reports four more cases, two of them successful, in the Berlin *Klinik. Zeitschrift*, No. 4, 1870.

	Cases.	Cures.	Deaths.
Nussbaum	34	18	16
Stilling	17	8	9
Spiegelberg	14	8	6
	65	34	31

This gives a success of 52.3 per cent., which is 10.64 per cent. above the average before given, and a gain of 25.03 per cent. since the commencement of 1864 (p. 312). The causes of the comparatively bad success of this operation in Germany will be considered in a subsequent chapter.

The *literature* of Germany on this subject contains very ingenious suggestions respecting the different steps of the operation, some of which will be explained farther on.

The first who boldly defended ovariotomy in Germany was Bühring, of Berlin. He attempted to obtain a footing for it as the only radical cure in all forms of ovarian dropsy. His monograph, entitled "Die Heilung der Eierstockgeschwulste," was published in 1848. He himself attempted ovariotomy four times. Three of his patients died. One of his operations was not completed, and this patient recovered.

In 1850, Quittenbaum, Jr., wrote a thesis maintaining that large adhesions could no longer be considered as contra-indicating ovariotomy; and in 1852 he declared that no doubt could longer exist as to the feasibility of the operation, after so many favorable results had been obtained. In 1852, E. Martin advised to fasten the cyst temporarily to the abdominal walls before opening it, so that nothing might escape from it into the abdominal cavity. Scanzoni performed his first operation in June of this year. It was not successful. He afterward speaks of ovariotomy, in his work upon the "Diseases of Women" (p. 420), as mere surgical foolhardiness, since cases apparently the most favorable may turn out unfavorably.

Kiwisch's lectures on "Diseases of the Ovaries" were published at Prague in 1856, and were of great merit. They exerted a powerful influence, though his statistics were not in favor of ovariotomy—giving but three recoveries in fifty-four cases. He himself had then operated but three times, and but once successfully;[1] though he had also had two unfinished operations. He also had a fatal case in 1860—his last operation.

[1] "Diseases of the Ovaries," translated by Dr. J. Clay, p. 209.

But the hitherto gradually-increasing interest in ovariotomy in Germany received a check—its death-blow Fehr remarks—from the famous discussion in the French Academy of Medicine in the winter of 1856–'57, of which an account has been given in the previous section. The statistics of Dr. Fock were also published in 1856,[1] and those of Simon in 1858, and both very much aided to discredit the operation, so that, as we have seen, there was but a single operation in Germany (a failure) in 1857; a single successful one in 1858; none at all in 1859; two failures in 1860; no operation in 1861; and one failure in 1862.

Scanzoni had also contributed to the general opposition, by the publication, in 1857, of a very unfavorable essay. He spoke of ovariotomy as a surgical temerity, and would renounce the glory of having successfully performed it, till better accounts of it could be secured; regarding it as a proof of madness in the patient who should adopt it, and a crime in the surgeon who should abet such a mode of suicide.[2]

In 1859, Spiegelberg, of Breslau, first mentioned the clamp in Germany, and maintained that ovariotomy would become justifiable when better methods were devised. The clamp was, however, first used in Germany by Breslau, of Zurich, October 24, 1862.[3] In 1862 a favorable influence was felt in Germany from M. Nélaton's visit to London in 1861, and his favorable report upon ovariotomy on his return to Paris. In 1863, therefore, the number of operations again began to increase, and continued to do so till, in 1866, eleven cases, and, in 1867, fourteen cases, were reported. In 1863, also, ovariotomy was for the first time in Germany publicly discussed at a meeting of naturalists and physicians; when Simon advocated it in certain specified conditions in which iodine-injections cannot be used.

In 1864, Van Dusch was the first to recommend small hospitals or private residences for this operation. In this year, also, Dutoit published his statistical tables, which are remarkable for their accuracy; and Fehr's very discriminating brochure of eighty-three pages appeared. In 1865 we find Scanzoni taking a much more favorable view of ovariotomy than when he wrote the essay before referred to, and requesting reports of the condition of patients after the operation, since he found disease of both ovaries in fifty-one out of ninety-nine cases, and therefore maintained that there would be a tendency to relapse which had been overlooked. In 1867, Scanzoni himself operated twice more, one of the operations being a success. Nussbaum published his thirty-four cases of ovariotomy in 1869.[1] Finally, the work of Grenser was published in 1870. It gives an admirable historical and critical sketch of ovariotomy in Germany alone.

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[1] "Des Extirpation der Milz am Menschen," Gneissen, 1857.

[2] *The Lancet*, 1862, vol. ii., p. 568.

[3] Grenser, p. 24.

In Austria, ovariotomy had never been performed before 1866, and but twelve times since. Of these twelve cases, only one recovered, and eleven died—one from hæmorrhage, and ten from peritonitis.[2] At a meeting of physicians, April 12, 1866, Drs. Dumreicher and Braun, of Vienna, proposed tapping *per vaginam* and retention of the canula, as the best treatment of ovarian cysts.[3] Ovariotomy must, however, soon be generally accepted in this country also; as the following extract from the "Surgical Reminiscences" of Prof. Billroth, of Vienna, now being published,[4] demonstrates:

> Up to the present time I am tolerably contented with my results. I give here a short account of them, in order to encourage the performance of these operations, and especially to inform the colleagues into whose hands these lines may fall, that I have, personally, no reason for supposing that the results attendant upon ovariotomy will be less cheering in Vienna than they are in London. Hitherto, I have performed it nine times; and of these patients only two have died; giving, therefore, only a mortality of 22.2 per cent. The first four cases recovered, one after another; then two fatal cases occurred; to be followed again by three recoveries. The first case is related in my Zurich "Chirurgische Klinik," and the second, third, and fourth cases in the "Chirurgische Klinik," published at Vienna, in 1868. Of the remaining five cases the narration is now given.

I close this division of the subject with a list of the principal contributions in Germany to the literature of ovariotomy, in addition to those already mentioned.[5]

KRULL: "Therapie der Eierstockswassersucht," Rostock, 1848.

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[1] "Vierunddreissig Ovariotomien," München, 1869.

[2] Grenser, p. 36.

[3] Ibid., p. 30.

[4] In the *Wiener Med. Wochenschrift*, 1871.

[5] Dutoit, p. vii.

Al. Fr. Quittenbaum: "Ueber Eierstockskrankheiten," Dissert., Rostock, 1850.

Kiwisch: "Exstirpation eines Ovariencystoids," Verh. der Phys. Med. Gesellschaft zu Würzburg, 1850, I, Pag. 281, und "Prager Vierteljahrsschrift," 1851, Bd. I.

Kiwisch: "Klinische Vorträge," Prag, 1856, Bd. II., Pag. 286.

Ulsamer: "Ueber Ovariotomie," Dissertation, Würzburg, 1851.

Ed. Martin: "Eierstockswassersucht, deren Erkenntniss und Heilung, nebst einem neuen Verf. für Ovariotomie nach eigenen Erfahrungen," Jena, 1852.

Wagner: *Langenbeck's* "Methode zur Exstirpatio ovarii." Verh. der *Phys. Med. Gesellsch. zu Würzburg*, 1852, Heft vii., Pag. 181.

Busch: "Chirurgische Beobachtungen," Berlin, 1854.

Steudel: "Beschreibung einer cystenhypertrophie des Eierstocks," Tübingen, 1856.

Mehlhose: "De Tumoribus ovarii cysticis," Dissertatio, Gryphiæ, 1856.

Fock: "Operative Behandlung der Ovariencysten," *Monatsschrift für Geburtshülfe und Frauenkrankheiten*, Berlin, 1856, Hefte v., vi.

Scanzoni: "Ueber Ovariotomie," in *Scanzoni's* "Beiträge zur Geburtskunde," 1856, I., 196.

Scanzoni: "Krankheiten der weiblichen Sexualorgane," 1863, Pag. 425.

A. Müller: "3 Fälle von hydrops ovarii," Dissertatio, Rostock, 1857.

Simon: "64 in Deutschland theils ausgef., theils vers. Ovariotomien," *Scanz. Beitr. z. Geburtsk.*, 1858, III.

Spiegelberg: "Beitrag zur patholog. anatomie der Eierstockscysten," *Monatsschr. für Geburtsh. und Frauenkr.*, 1859, August, September.

Günther: "Lehre von den blutigen Operationen," Bd. iv., Pag. 165.

K. Hennig: "Ueber Operationen an den Eierstöcken," *Monatsschrift für Geburtsh. und Frauenkr.*, 1862, August, Pag. 160.

Several writers have accounted for the great fatality of ovariotomy in Germany and France, as compared with England and this country, by invoking a difference in climate (Busch), and in the constitutional tolerance of diseases and injuries of the abdominal viscera. I shall recur to this subject in a subsequent section.

SECTION VI.

OVARIOTOMY IN OTHER COUNTRIES IN EUROPE, AND IN ASIA.

Ovariotomy has very recently been performed for the first time, if at all, in most of the countries on the Continent which have not yet been mentioned in the preceding historical sketch. The scattered facts which have been accessible to me will be here stated:

Spain.—Ovariotomy was first performed in this country, and unsuccessfully, by Dr. F. Rubio, of Seville.[1]

Italy.—It is asserted by Fehr,[2] that the first operation of ovariotomy in Europe was performed by an Italian physician, Dr. Emiliani, of Faenza, in 1815; this being four years in advance of the operation by Chrysmar of Isny (Würtemberg). Dutoit gives a brief reference to this case in his table (p. 178). It has, however, been recently stated that the first ovariotomy in Italy was performed in January, 1865, by Dr. Dominico Peruzzi, of Sinigaglia;[3] and that Prof. Bezzi, of Modena, was the second, as well as the first successful, operator in that country.[4] Dr. Lundi, of Pisa, performed the twelfth operation in Italy, at Pisa, in 1869, which was successful. Dr. Feoratini, however, states in the *Ippocratio* for January, 1868, that up to that time there had been but seven ovariotomies in Italy, and all had proved fatal.[5] He suggests that the great want of success of this operation in Italy is to be ascribed to the late period when the operation is made. He also thinks the organic fibre is inferior in Italy to that of other countries, and that there is also in the former less moral force and firmness of purpose.

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[1] *The Lancet*, 1863, vol. ii., p. 636.

[2] "Die Ovariotomie," p. 6.

[3] *The Lancet*, January, 1869, p. 62, and 1865, p. 456.

[4] *London Medical Times and Gazette*, September 3, 1865, p. 260.

[5] *The Lancet*, 1868, vol i., p. 189.

Sweden.—Two successful operations were performed by Mesterton, at Upsala, in 1862. Dr. Sven Sköldberg, of Stockholm, who had followed the practice of Mr. Wells and Dr. Keith, had, up to the beginning of 1870, performed the operation twenty-one times in that country, with seventeen recoveries and four deaths. He had also had four cases of exploratory incisions, one patient dying in fifty hours, of peritonitis.[1]

Finland.—Haartman, of Helsingfors, operated in February, 1849. The patient died in two days, of peritonitis.

Poland.—In 1860, Bryk operated in Cracow, the patient dying four days afterward.

Switzerland.—Breslau, of Zurich, operated unsuccessfully in October, 1862, and afterward three times successfully.

Dr. Montel, of Vevay, had a successful operation in 1865. It was a case of large polycyst.[2]

In *Belgium*, iodine-injections are still pretty extensively used. Dr. Lefebre published an account of the present state of the question in that country in the *Presse Méd. Belge* for October 15, 1871. He concludes that "ovariotomy is the only operation we can propose when we have diagnosticated a solid tumor of the ovary, a mixed or composite tumor, or a multilocular cyst." Dr. Boddaut was the first Belgian surgeon who successfully practised ovariotomy.

Russia.—Ovariotomy was first successfully performed in Russia, December 23, 1862, by Dr. A. Krassovsky, at St. Petersburg.[3] The operation was performed in 1864, by Prof. Geoube, of Khaskoff; Dr. Tkovitz, of Tamboff; Prof. Shimanoffsky, of Kieff; Dr. Sklifassovski, of Odessa; and Dr. Kade, of St. Petersburg. In 1865 it was performed by Prof. Karavaeff, of Kieff; and Dr. Froben and Prof. Kieter, of St. Petersburg. Dr. T. Masslovsky, of St. Petersburg, obtained some very important results by some experiments on dogs respecting the kind of ligatures best tolerated in the abdominal cavity, and other instructive points, and which will be quoted in a future section.[4]

In *India*, ovariotomy was twice successfully performed by

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[1] *Edinburgh Medical Journal*, January, 1870, p. 653.

[2] *Gazette Hebdomadaire*, March 7, 1865.

[3] *Petersburger Medicin Zeitschrift*, 1863.

[4] *Edinburgh Medical Journal*, December, 1867, p. 538.

Dr. J. M. Joseph, surgeon of the Civil Hospital, Combaconum.[1] In 1869 it had been performed three times by a native surgeon, Mootoosawny Moodelly, M. D., of Manargudi, Tanjore District.[2] Only one of these was successful. A few operations have also been more recently performed in this country by British surgeons. Dr. De Renzy had operated twice before 1871, and in one case applied a horse-hair ligature to the pedicle.[3]

In *Ceylon*, ovariotomy has been performed by Dr. P. D. Anthonisy.[4]

In *New Zealand*, ovariotomy has been successfully performed by Dr. R. Tassel, of Auckland.[5]

In *Australia*, Dr. Tracy, of Melbourne, was the first to perform ovariotomy, and he saved ten out of his first thirteen operations.[6]

As an interesting item in the history of ovariotomy, the fact should be here stated, that an ovarian cyst has been removed *per vaginam.* This operation was successfully performed by Dr. T. G. Thomas, in February, 1870. The cyst was equal in size to a large orange. The following is extracted from Dr. Thomas's report of the case in the *American Journal of Medical Sciences*, April, 1870:

> Drs. Peaslee, Noeggerath, and myself, met in consultation, and carefully investigated the case. . . . In discussing the subject of treatment, three plans were proposed: 1. That the cyst should be allowed to develop so that ovariotomy might be resorted to after some years of life had been passed in comparative comfort; 2. That the cyst should be tapped *per vaginam;* and, 3. That the operation of ovariotomy should be performed through the fornix vaginæ, in the same manner that it is ordinarily accomplished through the abdominal walls. The last proposal was made by myself, and urged upon these grounds:
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> 1. I felt satisfied that, the cyst being movable (as proved by the fact that the knee-elbow position would at once cause it to roll out of the pelvis), sufficient space could be obtained through the fornix vaginæ to withdraw the emptied sac.

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[1] *Indian Annals of Medical Science*, January, 1858.

[2] Reported in the "Obstetrical Transactions," vol. x. (1869), p. 119.

[3] *The Lancet*, 1871, vol. i., p. 108.

[4] Ibid., 1864, vol. ii., p. 728.

[5] Ibid., 1870, vol. ii., p. 507.

[6] Ibid., 1871, vol. ii., p. 517.

2. I preferred this procedure to simple tapping, because drainage is very apt to follow paracentesis when practised through the vagina, which might exhaust the patient, and prevent a resort to vaginal ovariotomy at a later period. Furthermore, I did not regard the increase of danger attendant upon vaginal section as very great, even if removal of the cyst proved impossible; for, in case of such an occurrence, I proposed simply to tap the exposed cyst, and close the vaginal opening by silver sutures.

3. I urged the adoption of the vaginal operation, rather than waiting for the full development of the cyst, because of the peculiarly anxious nature of the patient. After being informed of the nature of the disease, she thought and spoke of almost nothing else; lost appetite, slept badly, and evidently depreciated in strength. From all that I could learn from her husband, who is a practitioner of medicine, from Dr. J. L. Brown, who had attended her, and from my own observation, I thought that she would prove a most unfavorable case for ovariotomy, at the time of full development of the tumor; and, to repeat a consideration just given in connection with paracentesis, I regarded the tentative process as not attended by great risk, since it involved incision only into the most dependent portion of the peritonæum.

On February 6, 1870, at 3 P. M., I proceeded to operate, in the presence of Drs. Peaslee, Brown, Walker, Purdy, J. C. Smith, and Sproat. Dr. Purdy having anæsthetized her with ether, she was placed in the knee-elbow position, and secured upon the apparatus of Dr. Bozeman. This apparatus not only completely secures the patient in this position, by straps and braces, but makes the position perfectly comfortable for any length of time, and also favors the administration of an anæsthetic. To prevent all possibility of the rectum falling into the line of incision, a rectal bougie was inserted for about five inches. Sims's speculum being now introduced, and the perinæum and posterior vaginal wall lifted, I caught the fornix vaginæ midway between the cervix and rectum with a tenaculum, drew it well down, and with a pair of long-handled scissors, one limb of which was placed against the rectum and the other against the cervix, cut into the peritonæum at one stroke.

The first step of the operation being now accomplished, I proceeded to the second. The patient's position was changed to the dorsal decubitus, and, passing my finger through the vaginal incision, I distinctly touched the tumor, which had now fallen again into the pelvis, and fastened a tenaculum in its wall. With a small trocar I then punctured, one after the other, three cysts, which gave vent to about six or eight ounces of fluid, which looked precisely like vomited bile. Drawing upon the cyst, it now passed, without difficulty, into the vagina.

For the third step of the operation the position of the patient was again changed. She was now placed in Sims's position on the left side, and his speculum introduced. Passing through the pedicle, at its point of exit from the vaginal roof, a needle armed with a strong double-silk ligature, I tied each half of the penetrated tissue, and cut off the cyst and ligature. The *cul-de-sac* of Douglas was then sponged, the pedicle returned to the abdominal cavity, the incision in the vagina closed by one silver suture, and the patient put to bed. The entire operation occupied thirty-five minutes, and presented no difficulties other than those slight ones incidental to ligature of a pedicle at some distance up the vagina.

Subsequent to the operation the patient was kept quiet and free from pain by opium, sustained by fluid food, and strictly confined to the supine posture. Her only discomfort arose from sleeplessness, and nausea which followed the use of the anæsthetic, and for ten days she progressed without any unfavorable symptom. At this time, being allowed to leave the bed and lie upon the lounge, she exerted herself unduly, and an attack of peri-uterine cellulitis invaded the right broad ligament. The pulse became rapid, the skin hot and dry, and a phlegmonous mass, as large as the fist, hard and painful to the touch, could be distinctly felt. This soon began to diminish, and now, at the end of the thirtieth day, has ceased to prove a source of any annoyance, while the general condition of the patient assures me that she is entirely out of danger.

Dr. Thomas regarded the attack of cellulitis as not at all dependent on the nature of the operation, but as due to an indiscretion on the part of the patient. I find, on recent inquiry, that there is now, over two years after the operation, no return of the disease.

Upon purely surgical grounds, vaginal ovariotomy is, I think, hardly defensible, since—

1. It is practicable only in case of a very small cyst, and while it gives no special inconvenience, to justify surgical interference in any other way.

2. It is more difficult than the legitimate operation of ovariotomy.

3. It is performed before the cyst has acquired a distinct pedicle (p. 63), and therefore the ligature cannot be applied with precision. If there be two or three cysts in the mass (especially if the case is one of polycyst), one or more of them will probably be left intact, to undergo subsequent development; and it is impossible to determine beforehand that a given tumor is a monocyst.

4. This operation is certainly not less dangerous than ovariotomy performed in the usual way, while the tumor is small and without adhesions. I think it decidedly more so.

But, if other considerations decide in favor of the operation, as in this instance, the operator will with advantage follow the example of Dr. Thomas, who conscientiously performed the operation eight times upon the cadaver before attempting it upon the living subject.

LEEDS SCHOOL OF MEDICINE

CHAPTER II.

OVARIOTOMY; STATISTICS; OBJECTIONS; CONSIDERATIONS IN FAVOR OF; TO WHAT CLASSES OF CASES ADAPTED.

SECTION I.

STATISTICS OF OVARIOTOMY.

Prior to the year 1860 only two statistical tables which professed to include all reported operations up to their time had been published, and both of them in this country. The first was compiled by Dr. W. L. Atlee, of Philadelphia, and published in the Transactions of the American Medical Association for 1851,[1] and the second by Dr. G. N. Lyman, of Boston, Massachusetts, in 1856.

In 1860, Dr. John Clay, of Birmingham, England, published a table of all the recorded cases up to the beginning of that year, and in 1864 the author of the present work collated the cases reported in 1860–'64. Also, in 1864, Dutoit, of Würtzburg, published a table, including all preceding operations up to November 30th of the previous year.

Several minor collections of cases have, however, been made from time to time, in this and other countries, and of which the most important are included in the following list:

1. In the United States.—Dr. J. T. Bradford: Report of cases of ovariotomy occurring in Kentucky, 1857.

Dr. Charles A. Pope: *St. Louis Medical and Surgical Journal*, June, 1859, and *American Journal of Medical Sciences*, 1859, p. 578.

Dr. D. McRuer: *Maine Medical and Surgical Reporter*,

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[1] Dr. Atlee had, four years before, published a table, including one hundred and one cases, in the *American Journal of Medical Sciences*, April, 1847, p. 330.

February, 1859, and *American Journal of Medical Sciences*, 1859, p. 287.

Dr. J. W. Hamilton: Ovariotomies performed in the State of Ohio.—*Ohio Medical Journal*, January and November, 1859, and *American Journal of Medical Sciences*, 1855, p. 577.

2. In Great Britain.—Mr. B. Phillips: Medico-Chirurgical Transactions, June, 1844, vol. xxvii., p. 468.

Dr. F. Churchill: *Dublin Medical Journal*, July, 1844.

Dr. S. J. Jeaffreson: *London and Edinburgh Monthly Journal*, May, 1845.

Mr. T. S. Lee: "On Tumors of the Uterus," etc., 1847, p. 264 (borrowed mostly without acknowledgment from Dr. Atlee's table published in 1845).[1]

Dr. Charles Clay: "Results of all the Operations for Extirpation of Diseased Ovaria," 1848.

Dr. Robert Lee (one hundred and sixty-two cases): Medico-Chirurgical Transactions, vol. xxxiv., 1850.

Mr. T. S. Wells: Reports of four hundred cases of ovariotomy, at different dates in Medico-Chirurgical Transactions, 1862 to 1871.

Dr. T. Keith: Report of one hundred cases of ovariotomy. *The Lancet*, September 7, 1867; and August 20, 1870.

3. In Germany.—Kiwisch: "Klinische Vortrage," Prag, 1856, B. ii., p. 286 (most of these cases were taken from Dr. Atlee's table, published in 1847, through the work of T. S. Lee).

Fock: "Monatschrift für Geburtshülfe und Frauenkrank.," May and June, 1856, H. v., vi., p. 370.

Simon: "Scanzoni's Beitrage zur Geburtsk.," 1858, III.

Dr. Otto V. Franques: "Scanzoni's Beitrage zur Geburtsk.," 1860, p. 211.

Grenser: Die Ovariotomie in Deutschland, Leipsic, 1870.

4. In France.—Chereau: "Historique de l'Ovariotomie," *Journal des Connaissances Méd.-Chirurg.*, 1844, Juillet; *et Union Médicale*, Octobre, 1847. This, the first table in the French language giving the statistics of ovariotomy, contains forty-four cases, of which twenty-eight recovered, and sixteen

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[1] See correspondence of Dr. Atlee with Dr. Lee on this subject, published in pamphlet by Dr. Atlee in 1848. Dr. Lee engaged to do Dr. Atlee justice in a future edition, but soon after deceased.

died; fourteen cases of unsuccessful attempts at ovariotomy, of which five proved fatal; and seven mistakes in diagnosis, with six recoveries. There was no tumor at all in these six cases. In the fatal case, the disease was uterine, and the uterus was removed.

Dr. A. A. Boinet: "Traité pratique des Maladies des Ovaires," 1867, p. 326.

Dr. E. Kœberlé: Report of sixty-nine ovariotomies in *Gazette Hebdomadaire de Médecine et de Chirurgie*, Août, 1868.

All the tables published previously to 1860 included, under the head of ovariotomy, all attempts to perform that operation, whether they succeeded in removing the ovarian tumor or not. Thus, simple ovario-section was confounded with actual oöphorectomy, and the real value of the results obtained was vitiated accordingly. The only exceptions were Mr. Phillips's and Dr. Jeaffreson's imperfect tables published in 1844; and it is very singular that their example was not followed. In using the tables of Dr. Atlee and Dr. Lyman, therefore, they will require revision in the respect just indicated; and I shall hereafter refer only to these two general tables, to Dr. J. Clay's, my own, and that of Dutoit.

Dr. W. L. Atlee's Table.[1]—This table includes two hundred and twenty-two cases, of which, however, fifty-seven are not cases of ovariotomy.[2] Of the one hundred and sixty-five cases of actual ovariotomy (oöphorectomy), one hundred and one recovered, and sixty-four died—cures, 60.6 per cent.

Dr. G. N. Lyman's Statistics.[3]—Of Dr. Lyman's three hundred cases, two hundred and twelve only were cases of oöphorectomy, and of these the recoveries were 57.22 per cent.

Dr. J. Clay's Table.—In 1860, Dr. John Clay, of Birmingham, England, published a table of all the attempted operations of ovariotomy to that time, in an appendix to his translation of Kiwisch's "Lectures on Diseases of the Ovaries." He obtained the majority of his cases from Dr. Atlee and Dr. Lyman, but improved upon both by arranging them under the separate heads of "completed ovariotomy" and "attempted ovariotomy," thus also including partial excision of diseased ovaria. He includes three hundred and ninety-five cases of completed ovariotomy, of which two hundred and twelve recovered, and one hundred and eighty-three died—53.67 per cent. recovered.

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[1] "Transactions of American Medical Association," 1851.

[2] Twenty-five of Dr. Atlee's cases were merely exploratory incisions, all of which recovered.

[3] "Prize Essay," 1856; and *American Journal of Medical Sciences*, April, 1857, p. 462.

Dr. Peaslee's Table.[1]—In 1864, I published a table, including one hundred and fifty additional cases of oöphorectomy which had occurred during the four years commencing with 1860. Of these cases ninety-nine recovered and fifty-one died—66 per cent. recovered. This brought the whole number of reported cases of completed ovariotomy up to five hundred and forty-five at the beginning of the year 1864.

Dutoit's Table.[2]—This table also appeared in 1864, and is intended to include the cases of completed ovariotomy, in all countries, up to November 30, 1863. It is a reproduction of Dr. J. Clay's table, with the additional cases reported in 1860 to 1864; and all the cases in each country are included under a distinct head. The operations are also arranged in chronological order. In all respects it is prepared with the utmost care. It includes five hundred and seventy-seven cases of actual ovariotomy from all sources, of which three hundred and twenty-three recovered and two hundred and fifty-four died—fifty-six per cent. recovered. The different countries are thus represented:

United States......	117 cases and	68 successes,	58.12 per cent.	recovered.
Great Britain......	379 " "	230 "	60.68 "	"
France............	26 " "	12 "	46.15 "	"
Germany[3]........	55 " "	15 "	27.27 "	"

Thus it appears that, previously to 1851, the recoveries from all the cases of ovariotomy were 60.6 per cent.; of all the cases up to 1856, 57.22 per cent. recovered; and of all, up to 1860, the recoveries were but 53.67 per cent. But it must also be remembered that, previously to 1851, very few but experienced surgeons ever attempted the operation; and that Dr. C. Clay, of Manchester, had performed no less than forty of the one hundred and sixty-five cases reported up to that time. Their results, however, encouraged inexperienced operators to try their skill, or in some cases their want of it, and for eight or ten years the average success of the operation was diminished. I find that the three hundred and ninety-five completed operations of ovariotomy which had been reported up to 1860 (Dr. J. Clay's table) were performed by no less than one hundred and fifty-seven individual operators; and that, of these, eighty-seven had reported only the single instance quoted. Several others also had operated but twice. And the percentage of recoveries would have been considerably less than 53.67, had not Dr. C. Clay alone contributed ninety-four cases of the three hundred and ninety-five, and with a success of sixty-nine per cent. Dr. W. L. Atlee and I. B. Brown also contributed nineteen cases each.

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[1] *American Journal of Medical Sciences*, January, 1865, p. 89.

[2] "Die Ovariotomie in England, Deutschland, und Frankreich," Würtzburg, 1864, Dr. Eug. Dutoit.

[3] Of Simon's forty-four cases, all in Germany (1858), twelve recovered—27 per cent.

The author's table for the first four years only of the last decade shows an increase of success from 53.67 per cent. (1860) to sixty-six per cent.; and it is again found that most of the operators were experienced surgeons, and that a few had already become expert ovariotomists. Dutoit, however, makes the general success up to 1864 to be but fifty-six per cent.

At the commencement of 1871, the general success of all the operations of ovariotomy cannot be less than sixty per cent. It, however, varies very markedly in different countries. In the United States—where the operation is not seldom attempted by mere physicians, who never think of performing any other surgical operation, even of the simplest kind—the general success is kept at a lower figure, and is probably not above sixty-three per cent. In Great Britain, at least seven-eighths of all the operations have for several years been performed by two experienced ovariotomists (Mr. Wells and Dr. Keith), and the general average is not less than sixty-six per cent. In France, however, the general success had fallen to 39.67 per cent. in 1867,[1] instead of 46.15 in 1864, and is now probably not less than fifty per cent. In Germany, the average success at the beginning of 1870 was 41.66 per cent.[2] against 27.27 per cent. at the beginning of 1864 (p. 326).

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[1] Boinet, p. 332, forty-eight successes in one hundred and twenty-one operations.

[2] Grenser, seventy-five successes in one hundred and eighty cases.

The general average of success, therefore, is not a fair criterion of the real value of ovariotomy as a surgical procedure, and I proceed to the statistics of those experienced in the operation.

It has been alleged that the statistics of ovariotomy are totally unreliable, since all the successful cases are reported, and many of the unsuccessful ones omitted. This objection has not been proved, and it is no more probable than the same assertion would be if made in respect to any other one of the capital operations. But, in case an operator of extensive experience reports all his cases, there is an end to such cavilling. I adduce the following remarkable instances:

Dr. Charles Clay's Statistics.—Up to December, 1871, Dr. Clay had performed two hundred and fifty ovariotomies, with one hundred and eighty-two successes—72.8 per cent.

Mr. T. S. Wells's Statistics.—Up to September 1, 1871, Mr. Wells had completed the operation of ovariotomy four hundred and forty times. Of four hundred of these cases, he has made reports as follows:

Of the first one hundred cases[1]	66	recovered and	34	died.
Of the second " "[2]	72	"	28	"
Of the third " "[3]	77	"	23	"
Of the fourth " "[4]	78	"	22	"
	293		107	"

Here is seen a progressive increase of success which must, doubtless, be mainly ascribed to increasing skill from a large experience. It is a fact of interest that of Mr. Wells's last one hundred cases, only fourteen per cent. died of those operated on in private practice; and thirty-one per cent. of those treated in hospital. On a former occasion he reported better success in hospital than in private practice. Out of the whole four hundred cases, Mr. Wells saved seventy-three and a quarter per cent., and of his last forty cases (since the four hundred) only eight have died. He thinks the average will yet be even ninety per cent. of cures in private practice, without excluding those extreme cases in which the operation is performed as a forlorn hope.

Dr. T. Keith's Statistics.—Dr. Keith, of Edinburgh, commenced his career as an ovariotomist in 1863, and has performed the operation of ovariotomy, up to the end of 1871, one hundred and thirty-six times. He has attained to the highest success yet achieved in Europe in this department of surgery, having saved eighty-one patients out of his first one hundred cases, and thirty of his next thirty-six. I may add that his cases have by no means been selected ones. On the contrary, very many of them were of an unpromising kind, and but few of them were of a desirable character. There were but three monocysts in the first one hundred cases. These remarkable results are ascribable to his great accuracy as a diagnostician; to his extreme delicacy and cautiousness as an operator, and, not least, to his most conscientious and unremitting care during the after-treatment. When he had operated one hundred and thirty-six times, he had never made a mistake in diagnosis.

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[1] "Medico-Chirurgical Transactions," vols. xlvi., xlviii.

[2] Ibid., vol. l.

[3] Ibid., vol. lii.

[4] Ibid., vol. liv.

Dr. J. T. Bradford's Statistics.[1]—These are here added as an illustration of the highest percentage of success yet achieved by any operator, though his experience is limited. Of thirty ovariotomies he had twenty-seven recoveries—ninety per cent.

The fact that the statistics of ovariotomy in France and Germany are far less favorable, especially till very recently, than in England and the United States, has been variously explained by different authors. I have already quoted some reasons, and suggested others, for the low average success of ovariotomy in Germany and in Italy (p. 317); and some French writers have suggested that the success in England is due to the stronger fibre—*la meilleure chair*—of the English, and assert that ovariotomy, therefore, fails even in Mr. Wells's hands when he operates on the Continent. A single failure at Brussels, however, cannot be logically applied in this way; and Boinet accounts for the difference in favor of English ovariotomists as follows:[2]

1. They select their cases, and submit all the monocysts and uncomplicated cases to ovariotomy; while the Parisian surgeons, not less able than they, have operated only on polycysts

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[1] Dr. Bradford died at his residence in Augusta, Kentucky, in October, 1871. He was a pupil, in ovariotomy, of Dr. A. Dunlap, of Ohio. I obtain the above statistics from MSS. sent me by his son.

[2] *Op. cit.*, pp. 336–339.

of long standing, and with complications. Kœberlé had, however, adopted the principles of the English surgeons, and had, therefore, succeeded better than those of Paris.

2. They take care to operate while patients are in good general health. In grave and complicated cases they succeed no better than the French.

3. In England and Scotland statistics were unfavorable at first, but favorable now. So with France, if we wait for the future.

Any statement implying that Dr. Clay, Mr. Wells, I. Baker Brown, and Dr. Keith, have selected only simple and recent cases of monocysts for operation, and that they operate only while the patient is in good health, is entirely unfounded. A large majority of all the cases operated on by these four gentlemen are polycysts, and not seldom with the most formidable complications; they do not refuse to operate in any but the most desperate conditions, and Mr. Wells and Dr. Keith prefer to wait till the health is impaired. Kœberlé, indeed, has adopted the principles in these respects of the operators just mentioned; but, in so doing, he also includes in his list a large share of the most formidable and undesirable cases.[1] Still, he and they have succeeded better than the Parisian surgeons in all classes of cases. Indeed, Kœberlé is very explicit in denouncing those who operate only in favorable cases. "It is easy to have fine statistics by selecting simple cases without adhesions, and practising exploratory incisions and operations left unfinished. One may obtain very splendid results by refusing to operate in unfavorable cases, and where the operation presents but a slight chance of success."[2] The surgeons of Paris are not less able operators, it is true, than English surgeons, but they are constitutionally less cautious, less deliberate, and more rapid; and cautiousness is of the first importance in this operation.

Grenser suggests that the reasons why English surgeons surpass all other nations in the results obtained in ovariotomy are to be found "in the easy and quiet temperament, with the hardier and better-nourished systems, of Englishwomen; the proper selection of the locality; rooms well ventilated on the second or third story, remote from patients with serious ailments; the great variety of precautionary measures; the superior operatic skill and manipulation; and nurses well trained for the work."

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[1] Je n'ai jamais reculé devant les difficultés de l'opération, du moment qu'elle ne m'a pas paru devoir être fatalement mortelle. Dans les cas les plus désespérés, du moment que l'opération avais été décidée je n'ai jamais voulu me résoudre à la cruelle extrémité de laisser l'opération inachevée (*Gazette Hebdomadaire*, Août, 1868, p. 498).

[2] *Gazette Hebdomadaire*, August, 1868, p. 499.

Metropolitan surgeons in all countries opposed ovariotomy at first, and afterward adopted it merely as an experiment, the surgeons of Paris being no exception to this statement. But the British surgeons above mentioned, and Kœberlé also, took up ovariotomy as a conscientious study. Dr. Atlee and several others in this country have done the same. The results have been such as might be expected under these two different influences. But, at last, metropolitan surgeons also, in all countries, have entered upon this arena with the true spirit of progress, and already the statistics even of Paris and of Berlin begin to emulate those of Edinburgh and London.

SECTION II.

OBJECTIONS TO OVARIOTOMY.

Only seven years since it was still necessary to adduce arguments to prove ovariotomy to be a justifiable operation.[1] It is now adopted so generally, in all countries, as we have seen, where surgery has attained to a high degree of perfection, that no discussion of this question is required. In the words of Nussbaum, of Munich, "ovariotomy is now justified and established forever."[2] As a matter of history it is, however, proper to specify, as briefly as possible, the objections which have been raised to it in former times:

1. *Ovariotomy is a barbarous and inhuman operation.*—This objection applied, to some extent, to all severe operations before the application of ether as an anæsthetic, in 1846; but more especially to this, perhaps, since, as Kœberlé remarks, the unfortunate patients were in some sort obliged, while still alive,

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[1] "Monograph on Ovariotomy," by E. R. Peaslee, M. D., pp. 39–46.

[2] "Vierunddreissig Ovariotomien."

to assist at their own autopsy. But it has been removed by the use of anæsthetics.

2. *It is too dangerous an operation.*—Every method of surgical treatment of ovarian tumors is dangerous to life, and no operation is too dangerous if the patient must die without it. But statistics settle this point, and show that ovariotomy is not more dangerous than several other operations constantly performed without any objection being raised on that ground. We have seen that in England and in this country the success of the most experienced ovariotomists varies from seventy to even ninety per cent., averaging, in private practice, at least seventy-five per cent. Can any other capital operation show such a record? Dr. Simpson showed, several years ago, that amputation of the thigh, and even of the arm, has a higher mortality than ovariotomy. So has ligature of the subclavian for aneurism, and the operation for hernia. Lithotomy is as fatal, in most hands, after the middle term of life. Even amputation of the leg is scarcely more safe, at all events, in the hospital practice of Paris and Glasgow.[1]

3. *But the statistics are not exact and reliable.*—If there was truth in that assertion, in the early history of ovariotomy—for this has not differed from the other capital operations in this respect—the assertion is no longer even relatively true. Mr. Wells, Dr. Clay, Dr. Atlee, Dr. Keith, and all of the most experienced ovariotomists, have, as we have seen, reported all their cases, unsuccessful as well as successful.

4. *The nature of the disease does not justify so violent a remedy*, since (a) it may terminate spontaneously, or (b) it may exist indefinitely without proving fatal.

a. In a preceding chapter we have seen how very rarely ovarian cysts spontaneously disappear (as after rupture), only a very few cases proportionately being found in literature. We have no grounds, therefore, to expect this termination in any given instance.

b. The cases of indefinite and prolonged duration are equally exceptional, and of no value as a basis of treatment. On the other hand, almost all the cases terminate fatally, without surgical interference, within four years at most after the patient detects the tumor, as has already been shown. But it is also asserted that—

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[1] "Selected Obstetrical and Gynæcological Works" of Sir James Y. Simpson, New York, 1871, p. 798.

5. *Palliative treatment, by tapping and internal medication, may prolong life indefinitely.*—I have collected the striking cases of this kind which have been recorded (p. 64), and almost all such cases are published on account of their rarity and curiosity. In fact, of the cases collected, and afterward traced during their lives, by Drs. Robert Lee and Kiwisch, and Mr. Southam—which had been treated by palliative tapping—who did not die of intercurrent diseases:

Ten per cent. died within twenty-four hours after the tapping.

Fifty-four per cent. died within one year after the tapping.

Seventeen per cent. died during the second year.

Eight per cent. died during the third year.

Nine per cent. died in from four to seven years.

Two per cent. were cured.

It is, however, only the cases of oligocysts and monocysts which give results as favorable as the above. For polycysts there is no remedy but ovariotomy, and palliative tapping is nearly as dangerous as the latter (p. 199). All medical treatment has also been shown to be inefficient.

6. *But permanent relief may not be secured, even though the operation succeed.*—In other words, if the ovarian tumor is removed, and the patient recovers, the other ovary also may, at some future time, become diseased and require removal.

Does an operation, of any kind, upon a single eye, or testis, or lower or upper extremity, guarantee the patient against a similar operation upon the other? When surgeons accept such a condition for other operations, equal stringency may be claimed for ovariotomy. The fact, however, that the other ovary is liable to be found diseased, in a different degree, at the time of the removal of the ovarian tumor, is never to be lost sight of by the operator, and will be considered in a future section.

7. *The diagnosis of ovarian tumors is difficult and uncertain.*—At the present time, this is, in fact, the only valid objection to this operation, but one which is constantly being di-

minished by improved methods of diagnosis. In the early history of ovariotomy, the mistake was not infrequently made, as has been seen, of opening the abdominal cavity for the removal of an ovarian tumor, to find either no tumor at all, or one other than ovarian. These were, of course, errors in diagnosis, but the former mistake is very seldom made nowadays, and the latter far more rarely than formerly. Perfect certainty of diagnosis in every case can, however, never be attained in respect to this class of diseases, any more than of all others.

We must, however, distinguish the cases of errors in diagnosis just specified from another class of cases often unfairly associated with them, even by the advocates of ovariotomy. I allude to cases of ovarian cysts which it is found impossible to remove, from the existence especially of adhesions which had not been foreseen. Such a case may be fairly reported as one of unfinished ovariotomy, but it is not a case of mistake in diagnosis. Every one knows it is simply impossible to predetermine the existence of adhesions at certain parts (p. 166); and, if they are found in the course of the attempt to remove the tumor, the operator has simply failed to achieve a diagnostic impossibility, which a scientific diagnosis does not profess to include.

I therefore adduce the following illustrations, not as errors of diagnosis, since only about seven per cent. of the cases were such, but as showing that ovariotomy was far more frequently left unfinished in former times than at present. Of the one hundred and sixty-two cases reported by Dr. R. Lee, sixty were left uncompleted, and of these nineteen died. In four of the sixty cases there was no ovarian disease to be removed. The last mistake of this kind, however, occurred to Dr. Granville, in 1829.[1] Of the sixty-four operations collected by Simon, in 1858, fifteen were not finished, and there were two errors of diagnosis.

Dr. John Clay (1860) includes in his tables three hundred and ninety-five cases of completed ovariotomy; one hundred and seven cases of uncompleted ovariotomy (twenty-five of partial excision, and eighty-two not finished by reason of adhesions); twenty-four cases not finished (no tumor, or tumor not ovarian); and thirteen errors of diagnosis. Thus, out of five hundred and thirty-nine cases, there were at least thirty-seven of mistake in diagnosis, and one hundred and seven cases which were not finished on account of adhesions, which could not be recognized before the operation was commenced.

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[1] "Medico-Chirurgical Transactions," 1851, vol. xxxiv., pp. 10–35.

Grenser (1870) adds to one hundred and twenty-nine cases of completed ovariotomy, in Germany, seven cases unfinished, and ten of mistakes in diagnosis. The errors in diagnosis, therefore, up to 1860, included about seven per cent. of all the cases; and, even in the last mentioned year, only a fraction less, in Germany, than seven per cent.

But in this country and in Great Britain the proportional number of diagnostic errors is not, among the most experienced operators at the present time, more than one to two per cent. And no instance has been of late recorded of opening the abdominal cavity, to find there was no tumor at all; but the error has consisted in mistaking some other form of tumor—generally a uterine fibro-cyst—for an ovarian cyst. Dr. Keith had not made a single mistake in diagnosis when he had operated one hundred and thirty-six times; and Mr. Wells very seldom made one in his experience of four hundred and fifty operations.

On the other hand, the number of unfinished operations, constituting up to 1860 a little more than one-quarter of all the cases, is constantly diminishing. Mr. Wells had had but nineteen cases in connection with his three hundred cases last reported. Dr. Keith had had but four cases up to January, 1872, in one hundred and forty cases, leaving one hundred and thirty-six operations completed.[1] Nussbaum finished every operation of his first thirty-four cases reported, and Kœberlé every one of his first sixty-nine. This, not because adhesions are now diagnosticated with very much more certainty than twenty years ago, but because such as would then have been considered a bar to the completion of the operation are now often overcome without hesitation. Indeed, it is now generally admitted that, as a general rule, Kœberlé is right in maintaining that the patient is far more likely to recover if the operation is finished, in case of an ovarian cyst, than if left uncompleted.

8. Finally, it has been objected to ovariotomy on the Conti-

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[1] Private correspondence.

nent of Europe, that the French and German women, at least, are not endowed with that tolerance of surgical interference with the pelvic viscera which the English and American women possess.

The continually-increasing percentage of successful cases, during the past seven or eight years, on the Continent, contradicts this view of the subject, and points to previous defects in the method of operating, rather than in the temperament and constitution of the patients. And we have already observed in our historical sketch, that in Germany even more than in France, since the operation was more recently introduced into the latter country, there was at first a tendency to experiment rather than to learn—to ignore what had already been done and settled in England and America, and to strike out, each operator for himself, with some new device. This obstacle is, however, now recognized by German surgeons themselves; as, witness the following remarks of Billroth, of Vienna; and the spirit he manifests will soon bring the Germans up to the British and American statistics:

"I recently received a visit from one of my former assistants, who had just returned from England, and he informed me that he had been present at the performance of his four hundred and twenty-seventh ovariotomy by Spencer Wells. Truly, we surgeons of the Continent cannot deal with proportions like these when appealing to our experiences in order to decide upon this or that mode of procedure; and just as Paris, Berlin, or Vienna, are mere small towns compared with London, so the total number of ovariotomies performed on the Continent is trifling when we consider the frequency of this operation in Great Britain. And yet we should relate our cases also, and especially for the sake of the unfortunate women who are the subjects of ovarian tumors, and who, remaining unoperated upon, or only submitted to tapping, almost all die in the course of a few years; for most of these might be saved by operation, and enjoy a long life afterward—and the more so, inasmuch as these ovarian tumors are seldom combined with other diseases, and most of these women, with the exception of the ovarian affection, are in good health.

"First of all, surgeons must dismiss from their minds that ovariotomy is a dangerous operation; and, through the medium of well-informed practitioners, this conviction must make its way with the public. After ovariotomy, skilfully performed according to the rules of art, recovery is the general rule, and a fatal issue the constantly-diminishing exception. Comparing it with some other operations, ovariotomy, taking the mass of cases, is shown by statistics to be less dangerous than amputation of the thigh, disarticulation of the shoulder- and hip-joints, or excision of the hip or knee. Its danger is about the same as that of amputation of the arm, excision of the shoulder, partial excision of the jaw, lithotomy in the young, and similar operations. We must, however, perform ovariotomy strictly according to the rules laid down by the English operators in their classical works; and only after having attained the same results should we venture to practically put into force our own ideas, in order to improve upon these. I had the good fortune to see Spencer Wells operate upon two complicated cases, and from them, as well as from oral communication with this remarkable man, I learned much. I constantly follow his precepts, knowing that he has long since thoroughly thought out and tested all that can happen to myself. I shall willingly regard myself during my lifetime as his scholar; and contented shall I be if it falls to my lot, by means of this operation, to snatch from certain death one-half the number of lives he has been enabled to save."

Nussbaum remarks that a principal reason of the unsuccess of ovariotomy in Germany was, a failure to appreciate the necessity of perfect cleanliness in all the details of the operation, which has always been so carefully secured in this country and Great Britain. Kœberlé claims that the improved success of this operation of late in France is due to improvements made by himself, both in respect to the operation and the after-treatment. But, admitting his decided merits in these directions, it may be remembered that success quite equal to his own had been achieved by the most experienced operators in England, Scotland, and the United States, even before 1863, when Kœberlé commenced.

We may, however, mention two influences which diminish the success of all capital operations while still in their infancy:

1. So long as the profession generally is opposed to the operation, it will be deferred to the last moment, before it is suggested to the patient; and the latter, therefore, falls into a very unfavorable physical condition for the operation.

2. Since the patient understands the operation is not recommended, but simply permitted as a last resort, it is submitted to as such, and thus is quenched the confident hope of recovery, which is perhaps the most powerful of all the influences tending to secure it.

On the other hand, when the profession have generally accepted the operation, it is seasonably recommended, and the patient may thus secure the best condition, both mentally and physically, to insure its success. Other special causes of the varying success of ovariotomy in different countries have been specified on pages 317 and 331.

SECTION III.

CONSIDERATIONS IN FAVOR OF OVARIOTOMY.

The following propositions have been established in the previous portions of this work:

1. Ovarian cysts, with very few exceptions, surely prove fatal within a few years;[1] less than four years from the time of their discovery, if polycysts—if not subjected to treatment.

2. Medical treatment of ovarian cysts has been alleged to have effected a cure in but twelve or fifteen instances in all; and all these cases are doubtful. There is, therefore, no rational ground for expecting a cure from this method of treatment in any particular case.

3. Tapping of ovarian cysts, at best, simply postpones for a time the necessity of removing them; but in case of polycysts it proves to be as dangerous as ovariotomy, and, besides, it affords but a slight, if any, temporary relief. It does not, therefore, in either form of cyst prevent the final necessity of ovariotomy.

4. Iodine injections are applicable only to cases of monocysts or oligocysts, containing a serous, purulent, or sanguine-

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[1] Boinet states that ovarian cysts kill ninety-eight out of one hundred patients in a short time.

ous fluid, and uncomplicated by adhesions or otherwise. It is, however, generally impossible to predict the absence of complications with any certainty after the cyst has attained the middle of the second stage; and, on the other hand, complications are to be expected by, or soon after, this time. Therefore these injections should be restricted to the first and second stages of monocysts—a period before ovariotomy is to be thought of.

5. The treatment of ovarian cysts by tapping and leaving the canula *in situ*, as improved by Dr. Noeggerath (p. 220), finds its true application only in cases of ovariotomy left unfinished by reason of adhesions, and some cases of cysts in which ovariotomy for any sufficient reason should not be attempted at all. Except as improved by Dr. Noeggerath, this procedure is more dangerous, however, than ovariotomy.

6. Ovariotomy, therefore, with the exceptions mentioned in the preceding paragraph, is the only curative procedure to be recommended for all ovarian cysts which have passed beyond the commencement of the third stage, and for polycysts at any stage, if found to be already undermining the general health.

7. Ovariotomy, in well-selected cases, is not comparatively a dangerous operation, ninety per cent. recovering, probably, in the hands of experienced operators. Over eighty per cent. have actually been saved of cases not selected for their promising features, but taken as they came under the operator's notice, who rejected none which seemed to afford any chance of recovery from the operation.

8. Ovariotomy, when successful, restores the patient, as a rule, to full and perfect health; while other capital operations are expected to leave some part or function at least impaired, if not removed. This proposition will be illustrated in the chapter on the physiological effects of this operation. Dr. Tyler Smith, who had at first opposed ovariotomy, admitted, after his first four operations only, that he had thus done more good in ovarian cases than in the whole of his previous professional career.[1]

9. Finally, ovariotomy excels all other strictly surgical procedures in its life-prolonging results to woman. I exemplify

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[1] "Obstetric Transactions," vol. iii., p. 63, 1862.

this proposition from the experience of Mr. T. S. Wells. The average age of the third one hundred patients ovariotomized by Mr. Wells was very nearly thirty-nine (38.97) years; and at the age of thirty-nine the expectation of life for a woman in health in England and Wales is, according to Dr. Farr's table of the mean duration of life,[1] $28\frac{5}{12}$ years. Had no operation been performed, ninety-five (Boinet says ninety-eight) of these women would have died in less than an average of four years, while the remaining five might possibly, but not probably, have averaged eight years each, of life. This would give an aggregate of $(95 \times 4) + (5 \times 8)$ four hundred and twenty years of life for the whole one hundred persons.

But Mr. Wells saved seventy-seven of his third one hundred cases, and thus added to their lives $(28\frac{5}{12} \times 77) - (4 \times 77)$ 1,880 years; while the loss of life on the part of the twenty-three who did not recover from the operation, if we assume the high estimate of four years for each, was ninety-two years. The result, therefore, of the third one hundred operations by Mr. Wells is the actual bestowal of $(1{,}880 - 92)$ 1,788 years of life on his one hundred patients, more than they would collectively have experienced had no operation been performed. And if we date from the operation only, with the seventy-seven who recovered, we find that $(77 \times 28\frac{1}{2})$ 2,188 years of average healthy life has been given them, instead of the (77×4) three hundred and eight years of misery they would have suffered up to their death; and of the four hundred and twenty years of miserable existence the whole one hundred would have passed.

Considering that the preceding estimate is lower than is justified by the facts—for the tables of Finlaison would have made the result at least twelve per cent. higher—it is a modest claim for Mr. Wells, that he alone, by his operations as an ovariotomist, now numbering four hundred and fifty, has added more than $(1{,}788 \times 4\frac{1}{2})$ 8,046 years to the aggregate lives of his patients, and secured to the survivors $(2{,}188 \times 4\frac{1}{2})$ 9,846 years of average health, in lieu of $(308 \times 4\frac{1}{2})$ 1,386 years of suffering.

By a similar calculation, upon the data on pages 248 and 276, it may be shown that, in the United States and Great Britain alone, ovariotomy has, within the last thirty years, directly contributed more than thirty thousand years of active life to woman; all of which would have been lost had ovariotomy never been performed.

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[1] "Chambers's Encyclopædia," Article, Mortality, Law of.

When Mr. T. S. Lee termed ovariotomy "an operation without its parallel,"[1] he alluded merely to its formidable surgical aspects; for its real value could not, in 1847, be appreciated. But all can now agree with Grenser when he terms it an operation fraught with happiness; with Dr. Keith, who thinks it a splendid operation;[2] and with Kœberlé, who terms it "un des plus beaux titres de gloire de notre époque chirurgicale."[3]

SECTION IV.

THE CLASSES OF CASES TO WHICH OVARIOTOMY IS ADAPTED.

Dr. J. Matthews Duncan admitted, in 1857, that cases justifying the operation may occur; but asserted that there is no class of cases for which it is a scientific therapeutic measure.[4]

It has been shown, on previous pages of this work, that ovariotomy is adapted to, and is the sole curative method for, the following classes of ovarian tumors:

1. All solid tumors.
2. All polycysts.
3. All dermoid cysts.
4. All monocysts also (and oligocysts), except the few cases which, for reasons before stated, should be treated by iodine injections, or by Dr. Noeggerath's method (p. 220).

Ovariotomy is, therefore, the only appropriate remedy in not less than eighty per cent. of the cases of the last-mentioned class, and in all the cases of all the other classes.

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[1] *Op. cit.*, p. 115.

[2] "I think it a splendid operation. At the same time I feel that I somehow know less about it than I seemed to do some years ago. There is yet much to learn about it."—(*Letter to the author*, *November*, 1869.)

[3] "De l'Ovariotomie," p. 34.

[4] *The Lancet*, May, 1857, p. 619.

LEEDS SCHOOL OF MEDICINE

CHAPTER III.

CONDITIONS DETERMINING WHEN OVARIOTOMY SHOULD BE PERFORMED; DIRECT CAUSES OF A FATAL RESULT.

SECTION I.

CIRCUMSTANCES MAINLY DETERMINING WHEN OVARIOTOMY SHOULD BE PERFORMED.

VERY often the operator has no choice, but must operate without delay if he would give the patient any chance of recovery. But, if the case come seasonably under his observation, the following circumstances should be considered :

A. The general health of the patient.
B. The kind and size of the ovarian tumor.
C. The thickness of the abdominal walls.

A. It is a question of the highest practical importance, whether the operation should be performed while the patient is in full general health, or be deferred till the latter is somewhat impaired. And we find that directly opposite opinions have been held by ovariotomists on this point. In 1864 "Mr. T. S. Wells, Dr. Black, and I. B. Brown, held that the more robust the patient is, the better. Mr. Hutchinson maintained that the earlier we operate, the better."[1] Spiegelberg, of Breslau, holds that the earlier ovariotomy is performed, the better is the chance of success.[2] On the other hand, Dr. W. L. Atlee, Dr. Bradford, Dr. Tyler Smith, Dr. Keith, and Mr. Erichsen, think the results of the operation are more favorable if the general health is somewhat impaired by the ovarian disease—which opinion I have always held.

Mr. Wells now adopts the latter view of this subject, and states that "patients in full health do not do as well as those accustomed to an invalid life;[1] but Dr. Clay, Mr. Bryant, and others, still hold to the former opinion. I. B. Brown operates as soon as the diagnosis is established; and Kœberlé prefers that the general health should not be enfeebled.[2] Nélaton and Nussbaum delay till the general health is decidedly impaired. I think this question should be decided on the following grounds, as shown in the monograph before referred to:

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[1] "Monograph on Ovariotomy," p. 55.

[2] "Archiv. für Gynækol.," 1870.

1. If we delay till the health is somewhat impaired, and the patient is slightly anæmic (at least, not having much pressure of blood in the vessels), we diminish the risk of peritonitis, which destroys one-fourth of all who die after the operation. Hæmorrhage is also less liable to occur. Dr. Black, indeed, remarks, in connection with this subject, that there is "less predisposition to inflammation with strength than with weakness."[3] Unless he means extreme weakness—a condition no one would recommend—I think his statement entirely unfounded; and, even with that qualification, it should be received with some degree of skepticism, since death after the operation, in cases of great debility, generally results not from peritonitis, but from shock or exhaustion, which are equally fatal with inflammation, since they together also destroy one-fourth of all who die. At all events, a long-distended state of the peritonæum very much diminishes its sensibility, and the danger of traumatic peritonitis. Dr. Black made the preceding remark in connection with a successful operation on a patient who had had the tumor ten years without affecting the general health; but, in another precisely similar case, I should delay for the preceding, and more especially for the following reasons.

2. If the ovarian disease has not yet deranged the general health, the patient is certainly in no immediate danger from it. She may, and probably will, live several months, and perhaps years, before she will be in danger. Is it right to expose her to the risk of dying in a few days in such circumstances? Certainly not, unless it can clearly be shown that the risk is constantly becoming greater from delay, and which I shall show is not necessarily the case. If, then, we are tolerably certain that

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[1] Correspondence, June, 1872.

[2] "De l'Ovariotomie," p. 51.

[3] *The Lancet*, October, 1863, p. 650.

the patient will live several months, or even some years without the operation, let us make sure of that amount of life first, and operate when it becomes apparent that the operation is the only means of much further prolongation of life.

3. By deferring the operation so long as the patient remains comparatively comfortable, we gain time, if there be doubt in the case, to perfect our diagnosis, by tapping, if so decided.

4. Those who operate in robust health do not have better success than those who wait for the general health to become somewhat impaired. Besides, some of the early successes of T. S. Wells and I. B. Brown have been achieved by a free bleeding of their patients when inflammatory symptoms came on—doubtless a wise expedient, if a patient is operated upon in full health, as it puts her on a par with one who had previously been somewhat anæmiated by the disease. I cannot, therefore, avoid regarding it as fortunate that most of every operator's patients do not come under his observation till the general health is somewhat impaired; so that, independently of his theory on the question under consideration, he is usually obliged to operate in this condition.

5. Certain comparative facts have been stated, on page 263, in respect to pathological amputations, and those of expediency; whence it must be logically inferred that ovariotomy is more successful if performed after the general health of the patient is somewhat impaired. My statistics and my observation also sustain this proposition.

6. If we wait till the general health is somewhat impaired, the abdominal walls will have become thinner, from absorption of the subcutaneous adipose tissue, and also from greater distention. When we come to attempt an accurate closure of the incision after the tumor is removed, it is found desirable that the parietes should not be more than one-half to three-quarters of an inch thick; and also that there is far less danger should vomiting or coughing occur after the operation, if the abdominal walls have been pretty largely distended. One of my patients nearly succumbed in consequence of the impossibility of accurately coaptating the edges of the incision through its entire thickness; and another was eventually lost from a strangulated hernia, produced by a violent cough, after the removal

of a small uterine fibroid.[1] But, on the other hand, we are of course not to delay the operation till the health is entirely broken down, lest death ensue from shock or exhaustion.

Except the slight debility of the patient, as just described, it is desirable that she should be as nearly healthy as possible at the time of the operation, and especially so far as the digesive function is concerned; and, if this is deranged, time should first be taken to correct the derangement. The debility should be due alone to the local and not to some intercurrent disease. If menstruation has been also arrested by the ovarian disease, I consider it a favorable condition. The uterus and ovaries being inactive, there is less danger of inflammation.

On the other hand, what are the dangers and disadvantages, if any, which may result from delaying, as I have recommended? We have to bear in mind the fact that non-malignant ovarian tumors do harm in only two ways:

1. By exhausting the system, from the amount of the elements withdrawn by them from the blood.

2. By mechanically interfering with the functions of the abdominal and the thoracic viscera.

But I have already advised the operation before the system is essentially exhausted, or the functions seriously interfered with. The strongest argument against delay is, the assumption that adhesions will be developed, if they do not already exist, and those existing will become more extensive and firmer; and thus the danger of the operation will be enhanced.

Certainly, we must eliminate from this category all cases in which ascites is complicated with the ovarian tumor, since, in such, few if any adhesions are formed at all, and can hardly increase after the fluid is abundant. Nor is it by any means certain that a tumor not thus complicated, which already distends the abdomen, and is probably already somewhat adherent, will be essentially more so a few months, or a year or two hence. If a solid tumor, or a monocyst, it probably will not be essentially more so. But I shall recur to this point. The only case in which we can rationally assume that a delay will secure a decided increase of adhesions, is a case uncomplicated with ascites, of an ovarian cyst, and especially a polycyst, still small, and movable in the abdominal cavity. But shall we accept Mr. Hutchinson's rule, and operate as early as possible, lest there may be adhesions a year or two hence? I have given the reason for first securing this addition of a year or two to the patient's life, and then dealing with the case as we find it.

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[1] *American Journal of Medical Sciences*, April, 1855, p. 398.

The importance of adhesions in determining the result of ovariotomy will be considered farther on. Meantime, admitting the increased danger from adhesions, it is suggested that a still greater will arise, if the operation is performed in full health, from the greater risk of hæmorrhage and peritonitis. As a general rule, therefore, I conclude that, *when the general health has become somewhat impaired, and not till then, the time for ovariotomy has arrived.*

But it does not follow that the experienced operator should refuse ovariotomy to one who is very much exhausted. If, in his judgment, there is even a very slight chance of recovery, he is bound to give the patient that chance, if, after a clear statement of the probabilities, she still desires the operation. As an index of the degree of impairment of health to be desired for ovariotomy, Dr. Keith waits till there is distinct emaciation of the thorax; Mr. Wells postpones till the patient is no longer able to walk a mile without difficulty; Mr. Bryant operates when she is molested by the size of the tumor to the extent that she can no longer perform her domestic duties, and the local effects become insufferable; and Dr. Greenhalgh defers till late, since the peritonæum thus becomes less sensitive and less liable to traumatic peritonitis.

And here occurs the question whether it is not well to tap the patient once before ovariotomy is resorted to; upon which I hold the following opinion:

1. If the case be clearly one of ovarian polycyst, tapping is excluded; but if there be doubt, while a polycyst is believed to exist, tapping may be practised to remove the doubt; it being understood that ovariotomy is at once to be proceeded with if the previous belief is confirmed.

2. Tapping may be resorted to in case of supposed monocyst (or oligocyst) (a.), for a diagnostic purpose, when the other means fail, provided the general health of the patient demands surgical interference; the operation of ovariotomy to be promptly per-

formed in case any untoward symptoms present themselves after settling the diagnosis affirmatively; or to be delayed till the cyst refills, as circumstances may decide. (b.) It may also be resorted to in cases of too great exhaustion for ovariotomy, and of very large cysts attended by great œdema of the lower extremities, with the expectation that the patient will rally from the tapping and then acquire sufficient strength to incur the risks of that operation. (c.) It may be practised in cases of great distention, in which it has already been several times performed with impunity, if, the proper time for ovariotomy having arrived, this operation must for the present be deferred on account of other controlling circumstances.

3. Tapping, for the removal of a large collection of ascitic fluid alone, is justifiable in cases of ascites complicating ovarian tumors, provided there are valid reasons for deferring ovariotomy, as it is also for diagnostic purposes, in cases supposed to be thus complicated. But the precept asserted by Kiwisch, that in simple, or compound cysts nearly allied to the simple, an attempt should previously be made in all cases with tapping, cannot be defended.

B. The *kind* of tumor also, and its *size*, determine to some extent when ovariotomy shall be performed. Dr. Keith remarks: "I prefer operating when the tumor is large, and when the patient has suffered a good deal. I never now operate when the patient is too well, and the tumor small. Perhaps my results are attributable to this."[1]

The polycyst demands an earlier removal than the monocyst. It sooner undermines the health, and the failure is also more rapid when it once commences. It also becomes more certainly adherent, and especially in the pelvis, where adhesions are most dangerous. Sometimes, though rarely, a polycyst has already decidedly impaired the general health before it has completed its second stage. On the other hand, dermoid cysts often exist for several years before they attain to a very inconvenient size, or impair the general health; and the same may be sometimes said of flaccid monocysts.

As a rule, a monocyst or oligocyst should not be removed till it has attained at least to the middle of the third stage. For

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[1] Correspondence, January, 1872.

(1.) then the peritonæum has become inured to distention and to friction from the cyst—which have rendered it far less sensitive and less liable to traumatic inflammation, after ovariotomy. (2.) The walls collapsing subsequently to the operation, after such distention, far less mischief will result if tympanites, vomiting, or coughing, should ensue. (3.) And, lastly, the abdominal walls will thus have become thinner. In one of my patients the parietes were two inches thick for an extent of about three inches; and, it being impossible to perfectly close the incision internally, suppuration inducing septicæmia occurred, from which the patient barely recovered.

The complication, therefore, of ascites with ovarian cystoma is favorable rather than otherwise, if due only to the ovarian disease, since it distends and makes thinner the abdominal walls, and renders the peritonæum less sensitive. It has been already stated herein, that it also to a great extent prevents the formation of adhesions; while the tapping it necessitates enables us to perfect the diagnosis, and often to ascertain the presence of adhesions, if actually existing.

C. It is therefore better to wait, *cæteris paribus*, till the abdominal walls have become decidedly thinned by the development of the tumor; a thickness of more than one inch being very undesirable.

SECTION II.

DIRECT CAUSES OF A FATAL RESULT OF OVARIOTOMY.

The recognized causes of death are somewhat numerous, while, in a considerable proportion of the cases, they have been reported as doubtful or entirely unknown.

Of one hundred and fifty cases of ovariotomy collected by myself,[1] fifty-one died after the operation, and from the following causes:

	Per cent.		Per cent.
Peritonitis	12=23.53	Strang'n of intes. in wound	1= 1.96
Septicæmia	9=17.65	Diarrhœa	1= 1.96
Shock or collapse	7=13.72	Erysipelas	1= 1.96
Exhaustion	7=13.72	Tetanus	1= 1.96
Shock and septicæmia	1= 1.96	Ulceration through bladder	1= 1.96
Hæmorrhage	1= 1.96	Unknown	9=17.64

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[1] *American Journal of Medical Sciences*, January, 1865.

Thus peritonitis destroys nearly one-fourth of all who die after ovariotomy (and some statisticians say even forty-three per cent.); septicæmia (blood-poisoning) destroys about one-sixth of all; shock, collapse, and exhaustion, each over one-eighth. I use the term septicæmia, as being here more accurate than pyæmia. Previously to 1864, peritonitis and hæmorrhage were the most frequent causes of death, except that exhaustion ranks next after peritonitis in Great Britain. The following table shows the comparative influence of these three causes in the four countries in which ovariotomy has been most frequently performed:

CAUSE OF DEATH.	Great Britain, 138 Cases.	United States, 46 Cases.	Germany, 37 Cases.	France, 13 Cases.
Peritonitis	59	13	21	3
Hæmorrhage	13	11	7	2
Collapse and shock	13	1		1
Exhaustion	32	8	2	1
Pyæmia (septicæmia)	1	1 pyæmia and shock.	1	
No cause assigned	20	12	6	6

Thus, hæmorrhage formerly proved fatal in from one-ninth to one-third of the cases in which the causes of death were specified,[1] and peritonitis in from two-thirds to three-eighths of the cases. Exhaustion was the cause of death in about one-fourth of the specified cases in Great Britain and the United States, one-fifteenth in Germany, and one-seventh in France. Septicæmia had scarcely been recognized up to that date, and only a single instance each is mentioned for Great Britain, the United States, and Germany.

The other causes of death cannot be classified. There may be added, as rarely occurring, pulmonary apoplexy, suffocation, pulmonary hæmorrhage, bronchitis, pneumonia, embolism of the pulmonary artery, tympanites, gangrene of the intestines, rupture of the stomach, diabetes, and congestion of the brain. Bilious vomiting has also proved fatal, especially in cases in which the clamp has been so applied as to drag upon the uterus. Consecutive abscesses may also prove fatal.

It is an interesting fact that but one of the fifty-one deaths in my collection of cases is attributed to hæmorrhage. This would indicate that better precautions have more recently been taken against hæmorrhage than formerly, in the management of adhesions and of the pedicle. It is, however, not improbable that some of the nine cases of death from causes not known were due to hæmorrhage, and some of the instances of septicæmia may have been the secondary result of a hæmorrhage not sufficiently rapid to prove fatal as such. In some of the cases of death from exhaustion, the actual cause may have been a slow bleeding internally.

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[1] That is, one hundred and eighteen cases in Great Britain, thirty-four for the United States, thirty-one for Germany, and seven for France.

Very little influence was formerly attributed to shock or collapse, except in Great Britain, as the preceding table shows. Dr. Atlee, however, recognized it early in this country as a cause of death. In his thirty-eighth case the patient died, on the third day, from collapse, induced by profuse perspiration and diuresis; and in his two hundred and sixteenth case it was produced by effusion into the peritoneal cavity from the surface whence adhesions had been detached.[1]

It follows, then—from my own table—if we ascribe only five per cent. of the deaths after ovariotomy to hæmorrhage, that peritonitis, shock and collapse, hæmorrhage, exhaustion, and septicæmia, together, cause seventy-three and one-fourth per cent. of all such deaths. And all the special conditions of the individual patient, which tend to prevent the occurrence of these causes, just so far tend to render the operation successful. I shall consider the conditions affecting its result in the following chapter.

Of twenty-three fatal cases reported by Kœberlé,[2] death occurred at the following dates after the operation:

In one day........	2	3	4	5	6	7	8	One month.
One died,.........	5	7	4	0	1	3	2	1

The influence of the above-mentioned causes, in determining the time and number of deaths, in one hundred and fifty cases collected by Dr. J. Clay, is shown in the table on the following page.

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[1] *American Journal of Medical Sciences*, April, 1871, p. 398.

[2] Kœberlé, *Gazette Hebdomadaire*, *loc. cit.*, p. 500.

Date of Death after Ovariotomy, showing the Influence of the Preceding Causes.[1]

TIME OF DEATH.		DEATH CAUSED BY											Total.
		Shock or Collapse.	Hæmorr'age.	Peritonitis.	Phlebitis.	Tetanus.	Intestinal Affections.	Abscess.	Chest-Diseases.	Congestion of Brain.	Diabetes.	Not stated.	
Within two hours..		..	3	..	..	..	..	..	..	..	..	..	3
Between	2 and 12 hours	2	2	..	..	..	..	..	..	..	..	3	7
	12 " 24 "	6	6	4	..	..	..	..	..	..	..	3	19
	24 " 36 "	4	3	8	..	..	..	..	..	..	..	2	17
	36 " 48 "	2	4	9	..	..	2	..	..	.	..	1	18
On the	Third day....	2	3	12	..	..	..	..	1	..	..	4	22
	Fourth day...	2	1	6	..	..	..	..	1	..	..	..	10
	Fifth day.....	2	1	5	..	..	1	..	..	..	..	2	11
	Sixth day....	2	1	7	..	..	..	..	1	..	..	..	11
	Seventh day..	1	..	2	..	1	1	..	..	1	..	2	8
	Eighth day...	..	..	..	..	..	1	..	..	..	..	..	1
	Ninth day....	1	..	2	..	..	1	..	..	..	..	..	4
	Tenth day....	1	..	2	..	..	..	..	..	..	..	..	3
	Eleventh day..	..	..	1	..	..	..	..	..	..	..	..	1
Between	11 and 13 days	..	..	2	..	1	..	..	..	..	..	1	4
	13 " 15 "	..	..	..	..	..	..	..	1	..	..	..	1
	15 " 18 "	..	..	1	..	..	..	..	..	..	1	..	2
	3 " 4 weeks	..	..	3	..	..	..	..	..	..	..	..	3
	4 " 5 "	..	..	..	..	..	..	1	..	..	..	..	1
	5 " 6 "	..	..	..	..	..	..	..	..	..	..	1	1
	6 " 7 "	..	..	..	..	..	..	2	..	..	..	..	2
	7 " 10 "	..	..	..	1	..	..	..	..	..	..	..	1
Total.....		25	24	64	1	2	6	3	4	1	1	19	150

Thus shock and collapse, when fatal, prove so in more than one-half of the cases within forty-eight hours, and in more than two-thirds within ninety-six hours. About one-half of those who die of hæmorrhage perish within twenty-four hours, and seven-eighths within seventy-two hours. Acute peritonitis proves fatal in twelve to twenty-four hours, and on to the eighth day; nearly one-fourth of the whole number dying on the third day alone, and nearly two-thirds of the whole within the first seventy-two hours. Asthenic peritonitis proves fatal from the ninth up to the twenty-first day, or even later.

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[1] Dr. J. Clay's tables, Appendix to Kiwisch's Lectures, p. cxxxiii.

CHAPTER IV.

PRINCIPAL CONDITIONS PREDISPOSING TO A FAVORABLE OR TO AN UNFAVORABLE RESULT OF OVARIOTOMY.

All conditions which tend to prevent or produce peritonitis, septicæmia, hæmorrhage, and the other causes of death specified in the preceding chapter, so far influence the result of the operation, either favorably or the reverse. Some of them, however, as the age and the general health, do not exert an absolute influence, but only according to the degree under consideration. There is also far too great a tendency to ascribe a prevalent influence in a given case to some one of these conditions. They are divisible into five classes:

A. Conditions cognizable before the operation.
B. Those affecting the operator himself.
C. The comparative results of private and hospital practice.
D. Those detected, or produced, during the operation.
E. Those occurring after it.

The last will be considered in connection with the after-treatment of ovariotomy.

SECTION I.

CONDITIONS COGNIZABLE BEFORE THE OPERATION, WHICH INFLUENCE ITS RESULT.

Under this head are included:

1. The general health.
2. Progress and duration of the disease.
3. Size of the tumor.
4. State of the abdominal walls.
5. Age of patient.
6. The menstrual function.
7. Married or single state.
8. Coexistence of ascites.
9. Previous tappings.
10. Temperament and disposition of patient.
11. Social position.
12. Previous and concomitant diseases.
13. Previous treatment of the case.

1. **The General Health.**—It has already been shown that some impairment of the general health exerts a very favorable influence. On the other hand, both extremes are unfavorable; robust health predisposing to peritonitis and hæmorrhage, while great debility tends to shock or collapse. The breaking down of the general health, which I have denoted as attending the fourth stage of an ovarian cyst, is very liable to be followed by collapse, and especially if œdema of the lower extremities has also obtained. In this condition, also, septicæmia is very much to be feared, if any blood or ascitic fluid be left in the peritoneal cavity.

2. **Progress and Duration of the Disease.**—A slow progress and consequent long duration of the disease are favorable indications, since the peritonæum has been rendered insensible by its prolonged contact with the tumor, and the latter certainly cannot be a polycyst. Besides, the vital force has not been rapidly and extremely exhausted by such a cyst. A duration of five or six years is decidedly a favorable condition. But the question will in such a case occur, whether the tumor is not a dermoid cyst. On the other hand, a rapid growth is quite unfavorable, implying a speedy failure of the general health, such as a polycyst alone induces.

3. **The Size of the Tumor.**—This is a condition of great importance, as has already been explained; a large size—the middle, at least, of the third stage having been reached—being far more favorable than a much smaller. It both tends to prevent traumatic peritonitis, as we have seen, and also, by rendering the abdominal walls thinner, to remove one of the causes of septicæmia (p. 348). It also protects against injury, should tympanites, coughing, or vomiting, supervene after ovariotomy. The operator should, however, not wait to secure this advantage, at the risk of too great an impairment of the general health. The two extreme weights of the tumors in Dr. Keith's first one hundred cases were seven pounds and one hundred and twenty pounds—the average being somewhat more than thirty pounds. The last-mentioned tumor is the largest ovarian cyst ever removed successfully from the living body.

4. **The state of the abdominal walls,** so far as their thickness and the amount of the subcutaneous fat are concerned, has also

been alluded to (p. 348). The thinner the better, down to half an inch, or even less. For thus a perfect coaptation of the opposite surfaces of the incision is insured throughout, and a union of the whole thickness by the first intention.

5. **Age of Patient.**—The age, merely, of the patient, has no absolute influence over the results of ovariotomy; but certain conditions which attend particular epochs of life are doubtless influential in this regard. The oldest patient, on whom ovariotomy has thus far been performed, was seventy-eight years old, and the youngest six years and eight months, and both recovered. Both these cases occurred in this country; the first being a patient of Dr. W. L. Atlee,[1] and the second, of Dr. W. B. Barker, of Higginsport, Ohio.[2] The oldest of Dr. Keith's first one hundred patients was sixty-eight, and the youngest sixteen years old, and both recovered. All of his cases above fifty-two and below twenty-two recovered. The average age of his cases was 39.84 years.

Dr. Clay, of Manchester, states that the majority of those of his patients who died of shock and of peritonitis were young females; while those dying from prostration were chiefly elderly women. But he and I. B. Brown think that age does not much influence the result, his success having been about equal from the age of sixteen to fifty-seven years.[3] The conflicting results of the following statistics confirm his conclusion.

1. Dr. J. Clay's table (*op. cit.*, p. 128):

Under 20 years	11 cases.	7 recoveries.	63.6 per cent.
20 to 25 "	46 "	23 "	50 "
25 to 30 "	54 "	33 "	61.1 "
30 to 35 "	48 "	27 "	56.2 "
35 to 40 "	41 "	21 "	51.1 "
40 to 45 "	20 "	9 "	45 "
45 to 50 "	30 "	16 "	53.3 "
50 to 55 "	14 "	6 "	42.8 "
55 and upward	17 "	10 "	58.8 "

2. My own statistics afford the following results:[1]

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[1] *American Journal of Medical Sciences*, April, 1855.

[2] *Philadelphia Medical Times*, November 1, 1871. Mr. Alcott has since operated unsuccessfully on a child three years old.—*The Lancet*, February, 1872.

[3] *The Lancet*, June, 1863, p. 408.

[4] *American Journal of Medical Sciences*, January, 1865, p. 89.

Under 20 years	8	cases.	4	recoveries.	50	per cent.
20 to 25 "	16	"	12	"	75	"
25 to 30 "	13	"	10	"	76.9	"
30 to 35 "	24	"	11	"	45.8	"
35 to 40 "	20	"	16	"	80	"
40 to 45 "	10	"	6	"	60	"
45 to 50 "	7	"	4	"	57.1	"
50 to 55 "	10	"	8	"	80	"
55 and upward	8	"	7	"	85	"
Age not stated	34	"	21	"	61.7	"

From the above table, the most unfavorable epoch for ovariotomy is under twenty years; from thirty to thirty-five, and from forty-five to fifty, only one-half of all operated upon in these periods recovering. The most favorable period is thirty-five to forty years, and fifty years and upward—the recoveries amounting to $81\frac{11}{19}$ per cent. The difference, however, between thirty to thirty-five years (45.8) per cent., and thirty-five to forty years (80 per cent.), must have been accidental.

3. Mr. Wells's table is as follows:[1]

Under 20 years	7	cases.	7	recoveries.	100	per cent.
20 to 30 "	49	"	32	"	65.31	"
30 to 40 "	63	"	41	"	65.08	"
40 to 50 "	44	"	35	"	79.55	"
50 to 60 "	36	"	22	"	61.12	"
Above 60 "	1	"	1	"	100	"
	200		138		59	

From the above it appears that, below the age of twenty, and between the ages of forty and fifty, the mortality is less than between twenty and forty, or above fifty.

4. The ages of Kœberlé's sixty-nine cases[2] were:

Under 20 years	1	case.	1	recovery.	100	per cent.
20 to 25 "	6	"	4	"	66.66	"
25 to 30 "	7	"	5	"	71.43	"
30 to 35 "	21	"	16	"	76.19	"
35 to 40 "	10	"	7	"	70	"
40 to 45 "	11	"	7	"	63.63	"
45 to 50 "	6	"	4	"	66.66	"
50 to 55 "	3	"	1	"	33.33	"
55 to 60 "	2	"	1	"	50	"
60 to 65 "	1	"		died.	....	
72 "	1	"		"	....	

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[1] "Medico-Chirurgical Transactions," vol. l.

[2] *Gazette Hebdomadaire*, Août, 1868, p. 501.

Thus, the greatest number of cases, for any period of five years, was from thirty to thirty-five years; and, during this period also, the success was greatest, being 76.2 per cent. From twenty-five to forty-five, except the five years just mentioned, the success averaged 67.8 per cent. From twenty to twenty-five, and from forty-five to fifty-five, 66.6 per cent. were saved.

Summary of the Preceding Tables.

Under 20 years	27	cases.	19	recoveries.	70.37	per cent.
20 to 30 “	191	“	119	“	62.30	“
30 to 40 “	227	“	139	“	61.23	“
40 to 50 “	128	“	81	“	63.28	“
50 to 60 “	86	“	52	“	60.46	“
Above 60 “	6	“	4	“	66.66	“

From the above six hundred and sixty-five cases, we learn that the most favorable periods for ovariotomy are before twenty and after sixty years; and next, from forty to fifty years. From twenty to thirty years is less favorable; next, from thirty to forty years; and from fifty to sixty years is the decennium least favorable of all. The greatest number of cases occurs between thirty and forty years.

6. **The Menstrual Function.**—If scanty menstruation or even amenorrhœa accompanies the impairment of the general health and has existed for only two or three months, this condition is favorable for ovariotomy, as is the condition after the menopause.

Ovariotomy should be performed from a week after to ten days before menstruation, in case of a patient in whom this function has not been arrested. The few instances in which it has been successfully done during menstruation should not be quoted against this rule.

7. **Married or Single State.**—The married or single condition of the patient also affects the result of ovariotomy, and, as we would predict, the unmarried have the advantage. Of one hundred and sixteen of my collected cases, sixty-four were married, and fifty-two unmarried—the results being as follows: Of fifty-two single, thirty-eight recovered, 73⅓ per cent.; of sixty-four married, twenty-eight recovered, 59⅜ per cent.

Here there is a difference of nearly fourteen per cent. in favor of the unmarried. The majority of patients between twenty and twenty-five years, mentioned on p. 355 (twelve out of sixteen), were single; while the majority above forty-five were married, except seven patients between forty-five and fifty, of whom five were single. All the patients under twenty years were single; of whom, however, fifty per cent. of that list died. Of Mr. Wells's first two hundred cases, there were:

105	married or widows,	of whom	68	recov'd, and	37=35.23	per cent.,	died.
95	unmarried,	"	70	"	25=26.31	"	"
200		"	138	"	62	"	"

In his first one hundred cases the mortality among married and unmarried women was nearly equal. A much smaller mortality was observed among the unmarried women in the second one hundred cases.[1]

8. **Coexistence of Ascites.**—The coexistence of ascites with ovarian tumor exerts no positively unfavorable result upon the operation of ovariotomy, provided the accumulation of fluid is due merely to the ovarian disease (p. 281), and does not depend on cancer of the ovary, or organic disease of the liver, kidney, or heart. Great care should, however, be taken to remove all the fluid from the peritoneal cavity at the time of the operation, and we must be prepared to treat septicæmia if it should arise—as explained in the chapter upon the after-treatment. But the danger of septicæmia from this cause is, probably, more than compensated by the diminished risk of peritonitis and adhesions, already explained.

9. **Previous Tappings.**—The danger, as well as the propriety in certain circumstances, of tapping an ovarian cyst, has already been considered (p. 201). The question here arises whether a patient who has already recovered from a single tapping, or several, is thus rendered more liable to a fatal result when ovariotomy is performed. It has been shown that the idea, that tapping produces adhesions, cannot be defended on rational grounds. But the present question can be answered by statistical data alone, and which are no longer wanting.

According to my own table, tapping does apparently somewhat reduce the percentage of success. But I ascribe the unfavorable result in these cases rather to the exhausted state of the patients, which repeated tappings always finally produce, than to any direct effect of the tapping itself. I. B. Brown states that patients do badly who have beeen tapped very many times. I find the following results: Of fifty-seven who had been tapped from one to twelve times, twenty died after ovariotomy, or thirty-five per cent.; of twenty-two of the preceding, who had been tapped three to twelve times, eight, or 36.3 per cent., died; and of thirty-five who had been tapped once or twice only, twelve, or 34.26 per cent., died. A single patient, who had been tapped twelve times, recovered. We notice, however, a higher mortality in those who had been tapped three times or more, than in those who had undergone the operation but once or twice. Single tappings gave a mortality of only 14.2 per cent. Dr. Keith frequently taps large cysts a few days before ovariotomy.

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[1] "Medico-Chirurgical Transactions," vol. l., p. 551.

Stilling says: "No surgeon should ever puncture an ovarian cyst. Tapping is a crime." He repeats: "Never tap. Ovariotomy becomes more difficult the oftener a patient has been tapped before it, and the patient is made worse by every tapping."[1]

But the large experience of Mr. T. S. Wells may be accepted as conclusive on this point. I quote from his paper in the Medico-Chirurgical Transactions, vol. lii., p. 197.

> In order to weigh the value of these objections to tapping, I have gone over the records of my three hundred cases of completed ovariotomy, and have arranged in the following table the cases where tapping had never been practised, and where it had been performed from one to sixteen times:

	Cases.	Recoveries.	Deaths.	Mortality per cent.
Never tapped	135	98	37	27.40
Once tapped	78	58	20	25.64
Twice tapped	36	24	12	33.33
Three times tapped	19	14	5	26.32
Four "	9	6	3	33.33
Five "	3	2	1	
Six "	5	2	3	
Seven "	2	2	...	
Eight "	4	3	1	
Nine "	3	2	1	
Ten "	2	2	...	
Eleven "	1	...	1	
Fifteen "	1	1	...	
Sixteen "	2	1	1	
	300	215	85	28.33

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[1] "Extra-peritoneal Method of Ovariotomy," p. 161.

It may be seen that the general mortality of the three hundred cases is 28.33 per cent., and that one hundred and thirty-five patients, or nearly one-half, had never been tapped. In them the mortality is 27.40 per cent., not one per cent. less than the general mortality. In other words, the mere fact that a patient has or has not been tapped (so far as can be judged from three hundred cases in the hands of the same operator) does not affect the result of the operation by so much as one per cent. Indeed, the mortality of the patients not tapped, though less by about five per cent. than that of the patients who had been tapped twice, is greater than that of the patients who had been tapped once and three times. Thus, seventy-eight, or rather more than a fourth, had been tapped once, and the mortality was 25.64 per cent. Of nineteen who were tapped three times, the mortality was 26.32 per cent. Of the thirty-six who were tapped twice, the mortality was exactly the same as that of the group of cases tapped from four to sixteen times, namely, 33.33 per cent.—or one in three.

It may be taken, then, as almost certain that the mortality of ovariotomy is but little affected by tapping; that the fact of a patient not having been tapped, or having been tapped very often, is by itself of little or no value in prognosis. I have shown in a former paper that such adhesions as are apt to follow tapping have no appreciable effect upon the mortality after ovariotomy; and I can now add that, in some of the patients who had been tapped most frequently, there were no adhesions, and there were firm adhesions in some who had never been tapped.

10. **Temperament and Disposition of the Patient.**—These exert an important influence on the results of ovariotomy. A sanguine temperament, and a hopeful and courageous state of mind, do much toward insuring a successful result; timidity and despondency, together with a nervous temperament, may secure an unfavorable issue in a case otherwise promising. If, after comprehending all the risks of the operation, the patient confidently expects to recover from it, her mental state alone will enable her to triumph over much of its danger, and may insure its success. She should also feel that the operator selected is the one of all to save her. So important do I consider these matters, that I should decline to operate on a patient who entirely despairs of recovering.

A quiet, equable, and amiable disposition is also a very important element of success; while a restless, self-willed, or irascible woman is far less likely to recover. Kœberlé lost his ninth case, on the fourth day, from direct disobedience of his orders on the third. Dr. T. G. Thomas lost a patient promising well up to the eighteenth day, who in a fit of anger sprang out of her bed, and produced an internal injury and a collapse ending fatally within three hours. I have myself lost a patient, who never recovered from the effect of her excitement on being unkindly talked to by her nurse.

11. **Social Position.**—The external circumstances of the patient, including her social position, are also important, as affecting her state of mind, and the comforts required after the operation. But the mere external surroundings of the patient being mainly under our control, will be specified under the head of Preparatory Treatment, this exerting quite as much influence on the result of the operation as the circumstances I have specified.

12. **Previous and Concomitant Diseases.**—The diseases of the patient previously to the invasion of ovarian disease should also be alluded to here; of course, as influencing the result of ovariotomy unfavorably. I have to mention all acute inflammatory diseases, especially peritonitis, puerperal or otherwise; a tendency to inflammatory affections in general, or to high febrile reaction from slight causes; habitual torpidity of the kidneys, irritability of the stomach, indicated by habitual nausea or vomiting, a tendency to diarrhœa, an habitually inactive state of the skin; and all that we generally include under a cachectic habit. All these should, according to their degree, dissuade from the operation. The fact that any severe operation has recently been performed, should induce delay, at least.

Any concomitant disease, if acute, of course contraindicates ovariotomy for the time being. All organic diseases put the operation entirely out of the question. And the question of the existence of renal disease of any form is always to be considered before the idea of an operation is favorably entertained. Only those functional derangements which are produced by the ovarian disease itself must exist, as a general rule, in a patient who is accepted as a candidate for ovariotomy. Pregnancy, as a known complication with ovarian tumor, of course excludes the idea of ovariotomy, as does also a uterine fibroid; though, as we have seen (p. 95), this operation has several times been performed successfully on women not supposed to be pregnant, who had advanced even to the fifth or sixth month.

A rupture of the ovarian cyst should doubtless be regarded as actually increasing the danger of ovariotomy; but, on the other hand, the danger may be greater if the operation is not, than if it is, performed. Of late years, it has several times been done in such circumstances, and in a majority of instances with success. Mr. Wells had ten cases of ruptured cysts in his fourth series of one hundred cases, of which only three died. Even though the effused fluid has already produced a diffuse peritonitis, the operation may succeed. I have succeeded in such a case, and Mr. Wells had done so more than once[1] before reporting his third one hundred cases. In one instance[2] he saved a woman four months advanced in pregnancy, and without producing a miscarriage, by removing a cyst, weighing thirty-seven pounds, which had burst and produced peritonitis. Dr. W. W. Greene, of Portland, Maine, has also operated twice in case of ruptured cysts. One died of asthma, and the other of the preexisting peritonitis.[3] Dr. Wiltshire and Dr. Watson have published a case in which a patient was saved by promptly operating, who was rapidly sinking from hæmorrhage into an ovarian cyst.

Inflammation and suppuration of the cyst itself does not necessitate an unfavorable result of ovariotomy. On the contrary, there is usually a remarkable subsidence of the febrile and other unfavorable symptoms, immediately after the operation. I have operated successfully on a patient with suppurating dermoid cyst, with a red tongue and total anorexia, whose pulse had been 130 for two weeks previously. The pulse fell gradually after the operation, till at the end of twenty-four hours it was 74 per minute; the fever disappeared, and the appetite returned in forty-eight hours, and not a single bad symptom occurred during the patient's rapid convalescence. Mr. Wells reports three very striking cases of the kind, in which the falling of the temperature and the disappearance of fever after the operation were remarkable. In one of them the temperature fell from 101.4° to 98.4°, and the pulse from 120 to 100 in six hours after the operation.[4] In one of Dr. Keith's cases, the cyst became inflamed and gangrenous about a week after tapping. The pulse rose to 120, and tympanites and active peritonitis supervened. The patient was better almost immediately after ovariotomy, and made a good recovery.[1]

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[1] "Medico-Chirurgical Transactions," vol. lii.

[2] *The Lancet*, September 18, 1869.

[3] *Boston Medical and Surgical Journal*, March 2, 1871, pp. 138, 139.

[4] *Medical Times and Gazette*, January 27, 1872, p. 93.

During the present month (June, 1872) I have removed a suppurating ovarian cyst, containing sixty pounds of fluid, from a patient who had had a pulse of 150 for several days before the operation, as I was informed. She was in the last degree of emaciation, and could no longer walk at all. She rallied in one-half hour after the operation; the pulse fell 10 daily for the next four days, and she recovered without a single unpleasant symptom.

13. **Previous Treatment of the Case.**—This may exert a decided influence on the result of ovariotomy. I have recently lost a patient thirty-two days after the operation, from exhaustion; her digestive power having been destroyed by large doses of elaterium administered with the absurd expectation of thus removing the fluid in the ovarian cyst. Diuretics are sometimes persevered in, and to no purpose, until the patient is too far exhausted by the disease to rally from the operation.

a. The assumption that palliative tappings produce adhesions at the site of puncture, has been shown to be incorrect, except possibly in very rare instances. The table of Mr. Wells has also been given, showing that in fact they do not essentially diminish the success of ovariotomy. They may, however, be too often repeated, and the patient thus at last be placed in a very unfavorable condition for ovariotomy. But sometimes a tapping preliminary to the operation is proper, to give a patient who is very much debilitated a chance to rally, and then to tolerate the operation. In such a case the time most opportune for extirpation is, as a general rule, when the cyst has about two-thirds refilled. If there be œdema of the abdominal integuments and lower extremities, a tapping, one or two days before ovariotomy is performed, causes the wound to heal more readily.[2]

b. The treatment by injections of the tincture of iodine * exerts no important influence upon the result of ovariotomy, except in so far as they may have produced a peritonitis, and adhesions therefrom, from being carelessly made. Boinet maintains, however, that iodine-injections make the case more favorable for ovariotomy by contracting the cyst.

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[1] *The Lancet*, 1865, p. 480.

[2] Grenser, *Richmond and Louisville Medical Journal*, April, 1871, p. 383.

c. The treatment by evacuating the cyst and leaving the opening patent precludes a subsequent ovariotomy; being also adapted, as has been seen, to cases in which ovariotomy is not even previously to be attempted.

d. A firmly-applied abdominal bandage is sometimes recommended, on the theory that it retards the development of the tumor. This is a very doubtful assumption; and, if it be true, its pressure brings on the symptoms, from compression of the viscera, earlier than they would naturally occur, and thus ovariotomy is earlier necessitated. Some ovariotomists believe also that such appliances produce adhesions; which also I consider doubtful. But to a bandage so adapted, if required, as merely to support the weight of the tumor, there is no objection if the patient is thereby made more comfortable.

e. A previous ovariotomy does not necessarily compromise the result of a second operation, as we have seen. Dr. W. L. Atlee successfully performed a second ovariotomy on a patient on whom Dr. Charles Clay had successfully operated sixteen years before. Dr. Frederick Bird operated a second time unsuccessfully on a patient from whom he had removed an ovarian tumor fourteen years before; and Mr. Wells removed the remaining ovary from a patient operated upon nine months before by another surgeon, the patient dying on the seventh day. He also successfully removed the second ovary from a patient on whom he had himself operated eighteen and a half months before. This is the first case on record, of ovariotomy twice successfully performed on the same patient by the same surgeon. He has also since had another similar case, the fifth on record.[1]

Dr. E. T. Caswell, of Providence, Rhode Island, reports a successful case of ovariotomy in the *Medical Record* for August 1, 1867, p. 245. About three and a half years afterward, he successfully removed the other ovary.[2] He found the old cicatrix adherent internally to a fold of intestines, and would have injured the latter, had he made his incision in the course of it. Mr. Wells also found the old pedicle adherent to the site of the first incision. Boinet operated successfully a second time on a patient after an interval of ten years.[1] There was no trace of the first incision on the parietal peritonæum.

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[1] Grenser, p. 27.

[2] Private correspondence.

Dr. E. M. Hodder, of Canada, reports, in the *Canada Lancet*, June, 1872, a case of a second ovariotomy on the same patient, successfully performed three years and two months after the first, which will be given more in detail in a subsequent section.

f. The removal of the remaining ovary, if found diseased after removing the principal tumor, in other words, double ovariotomy, does not essentially increase the danger of the operation. It has already been stated that double ovariotomy was first performed, and successfully, by Dr. J. L. Atlee, of Lancaster, Pennsylvania, in June, 1843; Mr. Hawkins, later in the same year, had an unsuccessful case; Dr. F. Bird had a successful case in 1847; and my own case, in September, 1850, was the third successful case I find recorded. Dr. W. W. Greene has had four double ovariotomies, all successful; and raises the question whether, on account of the frequency of disease of both ovaries, it is not better always to remove both.[2] Scanzoni has already been quoted as adducing this fact as an argument against ovariotomy under any circumstances. I have removed both ovaries nine times, and seven times successfully. Kœberlé had thirteen cases of double ovariotomy in sixty-nine ovariotomies, or nearly one-fifth of all the cases. Seven recovered and six died; but in two of the cases the uterus was removed together with the ovaries. Dr. Atlee's double ovariotomies, up to August, 1868, amounted to one-thirteenth of his entire number.[3] Mr. Wells had seven double ovariotomies in his first one hundred and fifty cases,[4] and no more up to his first two hundred; and eight in his last two hundred. Seven of the fifteen died. Mr. Wells treated his cases by clamp on one side, and by ligature on the other. Dr. Green and myself applied ligatures to both pedicles in each case. Dr. Keith had six double ovariotomies in his first one hundred cases, of which four recovered and two died.

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[1] *The Lancet*, January, 1870, p. 119.

[2] *Boston Medical and Surgical Journal*, March 2, 1871.

[3] *Gazette Hebdomadaire*, August, 1868, p. 504.

[4] "Medico-Chirurgical Transactions," vol. l., p. 11.

Mr. Wells concludes that in not more than eight per cent. of the cases both ovaries are diseased at the time ovariotomy is performed; and he knew of but four instances out of his first one hundred and fifty cases in which disease of the second ovary occurred after successful removal of the first. Dr F. Bird considered that both ovaries will be found diseased in not more than three per cent. of the cases. Dr. C. Clay had but four double ovariotomies in his first two hundred and twenty cases.

SECTION II.

CHARACTERISTICS OF THE OPERATOR TENDING TO SUCCESS IN OVARIOTOMY.

Before considering the conditions of the patient developed during the operation, which affect its result, I premise some remarks upon points to be regarded by the operator himself. And, as most important in securing a favorable result, I insist on the most perfect cleanliness, and the utmost care and delicacy of manipulation in all the details of the operation.

1. **Necessity of Perfect Cleanliness.**—Fehr ascribes the remarkable failure of ovariotomy in Germany, till of late, to a want of care in this respect; and Nussbaum attributes its success in England and the United States to a scrupulous observance of this requirement, and a judicious treatment of the pedicle, which experience alone can enable one to achieve. "In 1861," says he, "not being aware of the cleanliness required, all the patients died."[1] Grenser also admits the absolute necessity of this precaution; which has from the first been well appreciated in the United States and in Great Britain, though still more attention on the part of some operators is demanded in this direction.

When we reflect that the peritoneal cavity is an immense lymph-sac (p. 13), we should expect to find the peritonæum to be endowed with the power of rapid absorption of substances upon its surface; and experience confirms this expectation. In cases of ovariotomy, apparent exceptions to this statement occur, only in so far as the peritonæum has undergone some change from its normal structure and condition. If a decomposed fluid is pent up in this cavity, symptoms of septicæmia promptly set in, unless ascites has coexisted with the ovarian tumor, in which case the modified membrane absorbs more slowly. If, however, on the other hand, the detachment of extensive adhesions has left the minute vessels open at numberless points, the decomposed fluid is thus at once admitted into the circulation, to produce the symptoms before mentioned. And the danger of septicæmia will be the greatest when the abrasions from the removal of adhesions are in the pelvis; since the decomposed fluid, naturally gravitating to the lowest portion of the abdominal cavity, remains constantly in contact with them. Fortunately, the peritonæum, if still in a nearly normal condition, as well as the abraded surface, can absorb fluids which are not decomposed, as well as those which are so; and hence, a small amount of blood, or ascitic fluid, left in its cavity when the incision is closed, may be promptly removed, and no injurious effects ensue. But, if not absorbed promptly, it will be so after decomposition ensues, and then comes the danger I have just explained.

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[1] "Vierunddreissig Ovariotomien."

The only safe course, therefore, is, most carefully to remove all blood, or ascitic or cystic fluid, from the peritoneal cavity, before closing the incision, this being altogether too important a matter to be left to chance.

But this precaution is the last of its kind, in point of time, which the operator is to carry into effect. He must also have been sure, before commencing the operation, that his hands, and especially the spaces beneath his nails, are perfectly cleansed of all particles of foreign matter; and, before putting them into the peritoneal cavity, they should again be cleansed from the blood which may have become adherent while making the incision. All the instruments, also, should have been cleaned with the utmost care; and the sponges should have been specially prepared, and never before used. The hands of each assistant should also have received equal attention with those of the operator; and no one should touch the peritoneal surface at all, unless requested to do so by him. Much is said of direct irritation of the peritonæum induced by the contact of foreign substances; but this membrane, as found in ovariotomy, is very tolerant of mere contact of substances, if not actual chemical irritants; it is the absorption of decomposed matter into the blood which is mainly to be guarded against. Silk or metallic ligatures or sutures, not themselves undergoing change, may remain in the peritoneal cavity, quite harmless, for an indefinite period; but a small decomposed blood-clot may, if not promptly removed, rapidly produce a fatal septicæmia. The oxide of iron left by the actual cautery in the stump of the pedicle likewise remains there without doing any harm. On the other hand, the smallest particle of matter already in a state of decomposition may, if left in the peritoneal cavity, impart its own condition to any fluid it meets there, whose absorption may determine a fatal result.

We are, moreover, not to forget the fact that the ovarian fluid itself is sometimes a very active irritant to the peritonæum (p. 75); and must, for that reason, also be removed, if it fall into the peritoneal cavity.

2. **Gentleness and Delicacy of Manipulation.**—The necessity of the utmost gentleness and delicacy of manipulation of the contents of the abdominal cavity is certainly very apparent, though often ignored. All unnecessary handling of the organs is, of course, to be avoided; and no undue violence is to be applied in any circumstances. I have seen the large intestine ruptured by attempts to detach adhesions from it, and the omentum torn into tatters in several instances while its adhesions were being detached from the ovarian cyst. I have once seen a pedicle torn by careless lifting of a tumor through the incision. Very seldom is there the least necessity for any such accident; while fatal hæmorrhage or septicæmia may be its consequence.

Of course, delicacy of manipulation implies caution and deliberation. Ovariotomy is not, therefore, an operation to be rushed through on time like an amputation, or the delivery of a woman in puerperal convulsions; and he who would make this operation an occasion for showing his operative dexterity, ought never to attempt it. There is not, except in the simplest cases, a point in its progress, after the first cut through the skin is made, which does not forbid rapidity of action. Hence, the surgeon who would be, or already is, in other departments of his art, a brilliant operator, proves to be a very poor ovariotomist. He who does not sacrifice every personal consideration, during the operation, to the one idea of safety to his patient, is entirely disqualified for its performance. Such a one may succeed, as almost any operator ought, in the few uncomplicated cases, but he signally fails where grave complications arise. "Show me a surgeon," remarks Dr. Bradford, "who in other operations may have his share of success, but who has a summary way of examining his patients, and of dispatching his operations, and I will show you one who is unsuccessful in ovariotomy."[1]

3. **Experience on the Part of the Operator.**—It is of course admitted that this is an important element of success in all surgical operations. But in none other is this proposition so emphatically true as in regard to the operation under consideration. The complications are so constantly varying in degree; so many circumstances have to be taken into consideration in deciding as to the precise time for the operation, and how to meet the ever-varying emergencies which arise during it, that he who begins as an ovariotomist quite confident of success, after seeing a few operations, especially if of the simpler kind, will soon find himself far less sanguine, and more reserved in his expectations. Dr. Keith remarks, after he had performed ninety-three ovariotomies, and saved seventy-seven (82.8 per cent.) of his patients: "I feel that I somehow know less about it than I did some years ago. There is yet much to learn respecting it." I have myself witnessed over one hundred ovariotomies—some of the operations by several of the most distinguished ovariotomists living, and some by beginners; but I have never seen a case, unless of the simplest form, from which I did not learn something of practical value.

It is therefore interesting to trace the increasing success of those who have had extensive experience. Mr. Wells gives the following results:

Of the first	100 cases	66	recovered,	34	died.
Of the second	"	72	"	28	"
Of the third	"	77	"	23	"
Of the fourth	"	78	"	22	"

Of the fifty-six cases in private practice, in the fourth one hundred cases, forty-eight (85.72 per cent.) recovered, and eight (14.28) died.

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[1] "Report on Ovariotomy," p. 15.

Dr. Clay, of his first one hundred and thirty-seven cases saved ninety-eight (71.53 per cent.), and lost thirty-nine (28.47 per cent.). Of his last one hundred and thirteen operations he saved eighty-four (74.34 per cent.), and lost twenty-nine (25.66 per cent.).

Of Dr. Keith's first fifty cases, thirty-nine recovered and eleven died; of his second fifty cases, forty-two recovered and eight died; i. e., he saved seventy-eight per cent. of the first fifty cases, and eighty-four of the second.

Kœberlé saved seventeen of his last twenty-two cases; and avers that this was not the result of accident, but of increased experience, and of improvements in the operation which he had made. In three of the fatal cases, there was an enormous loss of blood, the complications were immense, and the operation continued two hours; and, if there had not been extreme debility, two of these patients, he remarks, would have recovered. Of his first forty-seven cases, eighteen had died; and of his sixty-nine cases just one-third were lost. Maintaining that those who succumb after ovariotomy mostly die in consequence of the manner in which the operation is performed, and the patient treated after it, he considers that his results, though rather satisfactory, still leave much to be desired; for a third of the patients he lost might have been saved, if he had been able to recognize, or had not overlooked, the causes of accidents.[1] In his cases vii., xxxiii., and xxxiv., in which death occurred respectively from tympanites, from internal strangulation, and from enteritis, he says the fatal result should be attributed to the manner of operating and the consecutive treatment. In case xvi., death should be referred to the previous treatment; the patient should have been tapped before the operation. The consecutive treatment accounts for the unfortunate result of case xxv.; a collection of purulent matter, which should have been evacuated, having been overlooked. In cases xiv., xix., and xxii., death was the result of the manner of performing the operation; and in case xxix., of too long deferring the opening of a pelvic abscess. The remaining fourteen fatal cases were irremediable; and death was the consequence of their peculiarities.

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[1] *Gazette Hebdomadaire*, August, 1868, p. 500.

It is to such a spirit of self-criticism that we are largely to look for future improvements in ovariotomy. He, however, concludes his report as follows:

> The results in grave cases have been much improved during the years 1867–'68. I have had six recoveries in eleven such cases, while during the preceding two years I had obtained but two recoveries in twelve cases. The amelioration of the results more recently is attributable to the improvements (*perfectionnements*) which ovariotomy has undergone in its operative details; and of which improvements I have contributed a very large part.[1]

Previously, however, to this success, Mr. Wells and Dr. Keith had had a greater.[2]

In a paper read before the Royal Medical and Chirurgical Society, on the means of diminishing the mortality after ovariotomy,[3] Mr. Wells considers this will be effected especially—

1. By selecting proper cases only for it.
2. By determining the stage of the disease when it is most likely to succeed.
3. By carefully avoiding all unnecessary sources of danger by previous preparation.
4. By using anæsthetics to diminish or avert the shock.
5. By various cautions in the performance of the operation itself.
6. By careful after-treatment.

And these conditions can be secured for the patient by the experienced operator alone.

4. **Conduct of the After-Treatment.**—It is very desirable, therefore, that the operator himself superintend the after-treatment. Indeed, till within the last two or three years, I have uniformly declined to operate, unless the circumstances were such that I could also assume the subsequent management of the case. Until very recently the profession generally have had no definite ideas of the treatment required in grave cases after ovariotomy, the sources of information being so few, or not accessible. Dr. A. R. Jackson well remarks on the point under con-

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[1] *Gazette Hebdomadaire*, *loc. cit.*, p. 504.

[2] See report of the second one hundred cases of the former, and the first fifty of the latter.

[3] *The Lancet*, April, 1859, p. 321.

sideration: "Others may do well—friends may furnish such attentions as are always pleasant to the invalid, and skilled attendants may perform every duty—but there is none who feels a more intense anxiety for the recovery of a patient than he who has jeopardized that patient's life in order to preserve it."[1]

SECTION III.

COMPARATIVE RESULTS OF HOSPITAL AND PRIVATE PRACTICE.

Ovariotomy has never succeeded well in large public hospitals, for reasons of which some are quite evident:

1. Such hospitals do not afford the complete isolation and quiet which are so important after this operation.

2. The operation itself does not find the favorable conditions in a public operating-room, in respect to the air and other surroundings.

3. Surgeons who are accustomed to operate in public, encourage a rapidity in operating, and perhaps acquire an impatience of delay, which have been shown to be undesirable in the ovariotomist.

Ovariotomy was first attempted in a London hospital, as has been seen, in 1836; but the operation was not finished. It was first completed in 1840, by Mr. Benjamin Phillips; and performed for the first time successfully in 1846 by Mr. Cæsar Hawkins. The next success did not occur for twelve years, when, in 1858, Mr. Hutchinson had two successful cases. During the three years, 1858–'60, there were ten ovariotomies in the large public hospitals of London, of which nine proved fatal.[2] The still more recent results have already been given, the average mortality being no less than 78.33 per cent.

The experience of the large hospitals of Paris has been even more adverse. Boinet states that the first sixteen operations gave sixteen deaths.[3] But to the smaller, and to private hospitals, the preceding objections do not obtain. Mr. Wells's experience in the Samaritan Hospital, and I. B. Brown's, in the Surgical Home, illustrate this fact. While but one recovered of ten cases in the large hospitals, in the three years just mentioned, Mr. Wells saved eight out of twelve cases in the Samaritan.[1] Indeed, the late Sir James Y. Simpson has adduced the most cogent arguments to show that all operations, and the treatment of all diseases, succeed better in small than in large hospitals.

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[1] *American Journal of Medical Sciences*, July, 1866, p. 115.

[2] *British Medical Journal*, December, 1860.

[3] Page 370.

The Samaritan Hospital, where Mr. Wells has performed nearly one-half of all his operations (one hundred and eighty-five of his first four hundred cases), has but twenty-four beds; and the Surgical Home is of about the same capacity. M. Kœberlé has had most of his patients at a *maison de santé* just without the ramparts of Strasbourg; and Dr. Keith has achieved his remarkable success, in great part, in a private hospital; which is still more advantageous than a small public one, since all its appointments are under the supervision and control of the operator himself. Of Dr. Keith's first one hundred operations, seventy were performed in the same room, and sixty of these (85.7 per cent.) recovered. In such circumstances, all the details of the after-treatment can be minutely carried into effect, and this I consider the characteristic element of Dr. Keith's success.

It is generally assumed that much the most favorable circumstances for success after ovariotomy must obtain in private practice. But this is strictly true if the comparison be made with the large hospitals only. The small hospitals, though public, give almost an equal amount of success; and the private hospital, in the instance last quoted, even a greater than any experience in private practice. This is further shown by comparing the practice in a small hospital with the private practice of the same operator. Thus, Dr. Keith reports:

Of 70 cases in private hospital, 60 (85.7 per cent.) recovered.
Of 30 " " practice, 21 (70 ") "

Mr. Wells finds that in his first one hundred cases of ovariotomy, only 29.6 per cent. of his hospital patients died; while he lost 39.1 per cent. of his private patients. In the second one hundred cases, however, this was completely reversed, since he lost only 24.6 per cent. in private, and 34.2 per cent.

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[1] *British Medical Journal*, December, 1860.

in hospital practice. Taking the whole two hundred cases into account, therefore, we find the success almost completely equalized. Thus:

Of 89 hospital cases,	61 recovered,	28 (31.5 per cent.)	died.
Of 111 private "	77 "	34 (30.6 ")	"
200	138	62 (31 ")	"

Of his third and fourth one hundred cases, the following are the results:

Third 100 cases	Hospital cases,	52, 42 recovered,	10 died	(19.2 per ct.)
	Private cases,	48, 35 "	13 "	(27.3 ")
Fourth 100 cases	Hospital cases,	44, 30 recovered,	14 died	(31.8 per ct.)
	Private "	56, 48 "	8 "	(14.3 ")

Here, again, the hospital cases have the advantage in the third one hundred cases, and the private patients in the fourth. In the last forty cases of the fourth one hundred, there were twenty-four private patients, all of whom recovered. Of Mr. Wells's whole four hundred cases, there was an advantage of 2.5 per cent. in private practice. Thus:

Of 185 hospital cases,	52 died,	(28.1 per cent.)
Of 215 private patients,	55 "	(25.6 ")
400	107	

In contrast, also, with the above experience in the large Parisian hospitals, with a mortality of one hundred per cent., the recent experience of M. Péan is interesting. In an oral communication to the French Academy of Medicine, he stated that he had performed ovariotomy thirty-two times, with twenty-six recoveries, during 1870 and 1871.[1] Sixteen of these cases, with fourteen cures, occurred in a *maison de santé* at Lavallois-Perret, and the other sixteen cases, with twelve cures, within the fortifications of Paris. Several of these cases occurred during the siege of Paris; and one patient died of fright from the cannonade of Fort Bicêtre. Here, again, the small hospital is shown to be superior to private practice, and M. Péan attributes his great success there to the strictness with which the after-treatment was carried into effect. The experience of Mr. Bryant in a large hospital (Guy's) will be alluded to on a subsequent page.

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[1] *Medical Press and Gazette*, December 2, 1871.

SECTION IV.

CONDITIONS DETECTED OR PRODUCED DURING THE OPERATION, WHICH MODIFY ITS RESULTS.

1. Length of incision.
2. Adhesions.
3. Treatment of pedicle.
4. Amount of hæmorrhage.
5. Duration of operation.
6. The occurrence of vomiting.

1. **Length of Incision.**—Altogether too much stress has been placed upon the mere length of the incision as influencing the results of ovariotomy. Twenty-five years ago a spirited controversy arose in England between the advocates of the long incision (*operatio major*), and of the short (the *operatio minor*, as it was called). I shall consider the merits of this controversy, and the objections to what is termed the *operatio minor*, in the first section of Chapter VII., it being sufficient for my present purpose to state that by the short incision I mean one three to six inches long, and by the long one, an incision of ten inches or more, and sometimes extending from the symphysis pubis to the ensiform cartilage, as practised by Dr. Charles Clay.

If we select one hundred cases of ovariotomy performed by the long incision, and compare the results with those of one hundred cases done with the short incision, we sometimes find the advantage on the side of the former. Of the first one hundred and thirty-seven cases of Dr. Clay, who always operates by the long incision, ninety-eight recovered, and thirty-nine died; while of the first one hundred and thirty-seven cases of Mr. Wells, who avoids the long incision, if practicable, ninety-three cases recovered, and forty-four died. But, since these operators differ in regard to other operative details, it may still be inquired whether the results were not influenced by the latter, in both instances, rather than by the length of the incision.

In direct opposition, apparently, to the above statistics, is the statement by Kœberlé, that in his first sixty-nine cases the mortality was directly proportional to the length of the incision. He found that, of twelve cases in which the incision was five to ten centimetres long (two to four inches), only one died; of forty-eight cases, with a length of ten to twenty-five centimetres (four to ten inches), fifteen (one-third) died; and if the incision was twenty-five to forty centimetres (ten to sixteen inches), eight out of twenty-two died. But Kœberlé, unlike Dr. Clay, adopted the long incision only when obliged to do so. And since a long incision is necessitated mainly by a large size of the tumor or extensive adhesions, or both, he might as correctly have stated that the mortality was proportioned to the two latter conditions.

The only way, then, to settle this question statistically, is this: by the same operator performing a large number of operations by the long incision, and then the same number by a short one, and comparing the results. It is not probable that this will be done.

Meantime, the results arrived at by Mr. Wells in his experience of two hundred cases may be quoted, as showing that an incision of not over six inches is more favorable than a longer one; though here also the fact of coexisting adhesions and large tumors, in his cases of long incision, is not to be lost sight of. The following table gives the figures for his first two hundred cases of ovariotomy:[1]

Length of Incision.	Cases.	Recoveries.	Deaths.	Mortality per cent.
Under 4 inches.........	14	10	4	28.5
4 to 5 "	66	48	18	27.2
5 " 6 "	55	37	18	32.7
6 "	28	21	7	25.
7 "	15	10	5	33.3
8 "	13	8	5	38.4
9 "	6	4	2	33.3
10 and upward........	3	..	3	100.
	200	138	62	31.00

If we compare the cases where the incision did not exceed six inches with the cases where this length was exceeded, the result appears considerably in favor of the shorter incision. There were:

	Cases.	Recovered.	Deaths.	Per cent.
Not exceeding 6 inches......	163	116	47	28.33
Exceeding 6 inches..........	37	22	15	40.54
	200	138	62	31.00

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[1] "Medico-Chirurgical Transactions," vol. l., p. 552.

While, however, it appears that the mortality in my practice has been considerably greater where long incisions have been made, it also appears to have been of little consequence whether an incision four, five, or six inches in length has been made. This confirms an impression which I have formerly published, to the effect that, when an ovarian cyst or tumor can be removed by an incision which does not extend above the umbilicus, "the probability of success is much greater than when it becomes necessary to extend the incision much above the umbilicus."

Still, there should be no doubt that a large tumor with extensive adhesions is more safely removed through a long incision than a short one. Above all, no ovariotomist should commence an operation with an ambition to succeed with an incision of not more than one to two inches long. *A priori*, we might expect, and above it has been proved, that a difference of one or two inches in the length, so long as it does not ascend above the umbilicus, does not appreciably increase the danger. I have seen an operator tug for fifteen minutes at a collapsed cyst, attempting to draw it through an incision two inches long, and then desist from the operation because "there were strong and universal adhesions." The *post mortem*, three days after, showed there were no adhesions at all, and that the operation would have been one of the simplest, and probably, also, the most satisfactory, with an incision of even three inches.

The considerations which should decide the length of the incision, in each case, will be specified in the chapter upon the operation of ovariotomy.

2. **Adhesions.**—The mere fact of the existence or the non-existence of adhesions decides nothing as to the result of an ovariotomy, since they may be so slight as to produce no appreciable effect; or, on the other hand, when entirely absent, other conditions may determine a fatal result. In more than one-half (thirteen out of twenty-five) of Dr. Keith's fatal cases, there were "little or no adhesions." Kœberlé's statement, therefore, that ninety per cent. of the cases without adhesions ought to recover, needs qualification.

Adhesions compromise the result of ovariotomy, according to their degree of vascularity, their extent, and their locality; for their detachment must always produce some amount of hæmorrhage, and may thus also cause peritonitis, and perhaps ultimately septicæmia. At first, the discovery of any adhesion on opening the abdominal cavity was deemed a sufficient cause for closing it again, without removing the tumor. There is now a tendency to the opposite extreme—to allow no amount of adhesions to interfere with the completion of the operation. I shall consider this topic more at length in a future section.

The importance of adhesions has hitherto been generally recognized only so far as their extent and firmness are concerned; and the statistics have been arranged upon this basis. According to Dr. Hamilton's table, three-fourths recovered with the weakest and least extensive adhesions, while, if they are very extensive, four-fifths die.

According to Dr. J. Clay's statistics, of those who had—

No adhesions........	70	per cent.	recovered and	30	per cent.	died.
Slight adhesions.....	60	"	"	40	"	"
Extensive adhesions..	50	"	"	50	"	"
Extensive adhesions requiring ligatures	30	"	"	70	"	"

In Kœberlé's table,[1] including his first sixty-nine cases, we find that, of those who had—

No	adhesions	(20 cases)	17, or 85	per cent.,	recovered	and	15	per cent.	died.
Slight	"	(16 ")	13, or 81.2	"	"	"	19.8	"	"
Grave	"	(33 ")	18, or 54.5	"	"	"	45.5	"	"

The firmness of adhesions is important simply in so far as more hæmorrhage or laceration is produced in detaching them. But their vascularity is a very important element, and the following distinctions should be made:

a. Adhesions in cases of monocysts and oligocysts, if any exist, are usually but slightly vascular, being merely *physiological*, and not pathological, i. e., they are formed from an exudation poured out between the peritoneal surfaces brought into contact, and kept at rest in contact, after the tumor has attained to a large size, and for the purpose of supporting the tumor in that position; they are not the result of inflammation. The cyst and the peritonæum over it sometimes become inflamed, but not so frequently as to justify the expectation that inflammatory adhesions exist in any given case, unless symptoms of inflammation have clearly preëxisted. Hence we expect to find large tumors adherent at the upper part (and perhaps also on the sides) as a matter of course, and equally if there have been no signs of inflammation. But, unlike inflammatory adhesions, the union is not very firm, and generally they are but very slightly vascular. Hence, they are also generally easily overcome, and do not lead to any troublesome hæmorrhage. Adhesions to the viscera are also here less liable to occur.

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[1] *Gazette Hebdomadaire*, August 7, 1868, p. 499.

b. In case of polycysts, all this is reversed, as has been shown. (1) Adhesions are the rule, and not the exception; (2) they are more generally inflammatory, and always more vascular; (3) they therefore give rise to more hæmorrhage; and (4) they habitually attach the cyst to the abdominal, and often to the pelvic viscera. Adhesions, therefore, in case of polycysts, are far more dangerous than in case of monocysts and oligocysts, though the adhesions resulting from inflammation, in case of the latter, are of similar import, if similarly located.

All forms of adhesions are dangerous from the hæmorrhage they immediately induce, and the septicæmia which, rather than peritonitis, may in turn result from it. On the other hand, I concur with Dr. W. L. Atlee's opinion, that "peritonitis is less likely to occur in these cases than when the peritonæum is wholly intact. Its character is entirely changed, and it is no longer a serous membrane." But pelvic adhesions are very liable to be followed by a low form of inflammation of very fatal tendency.

The locality of the adhesions is also a matter for consideration, even more than their vascularity and extent. Parietal adhesions are the least dangerous, and those to the pelvic viscera the most so. Many regard the former of very slight consequence, and the omental as scarcely more important. The following table gives the mortality in Kœberlé's first sixty-nine cases of ovariotomy, as associated with adhesions in different localities:

Parietal adhesions	34 cases	15 died.	Uterine adhesions	10 cases	7 died.
Omental "	28 "	13 "	Mesenteric "	4 "	2 "
Intestinal "	16 "	7 "	Liver "	4 "	3 "
Pelvic "	20 "	11 "	Diaphragm "	2 "	

Finally, I give the mortality so far as the locality of the adhesions is concerned, in Mr. Wells's first four hundred cases of ovariotomy,[1] and Dr. Keith's first one hundred:[2]

Adhesions in Four Hundred of Mr. T. S. Wells's Operations and One Hundred of Dr. Keith's.

	First 100 cases. Adhesions noted only in second 50 cases.	Second 100 cases.	Third 100 cases.	Fourth 100 cases.	Dr. Keith's 100 cases.
No adhesions	22 cases—6 died	36 cases—6 died	34 cases—6 died	41 cases—6 died	22 cases—1 died 15th day.
Parietal adhesions.	18 " 5 "	38 " 6 "	31 " 5 "	16 " 3 "	28 cases—2 died.
Omental adhesions.	none	9 " 6 "	6 " 1 "	12 " 2 "	6 cases—2 died (1 extremely debilitated).
Parietal and omental adhesions.	none	6 " 2 "	19 " 5 "	13 " 5 "	14 cases—3 died.
Intestinal and omental, or parietal and mesenteric adhesions.	3 cases—1 died	11 " 5 "	7 " 5 "	10 " 3 "	none
Pelvic and intestinal adhesions.	none	1 died (30 hours)	1 recovered	6 " 3 "	16 cases—6 died (2 malignant)
Adhesions to liver or spleen.	none	none	none	none	1 to liver, omentum, and parietes, and 1 to spleen, recovered

Thus, in the four hundred and fifty ovariotomies, we have the following results:

No adhesions..............	155 cases,	25 deaths	= 16.1 per cent.
Parietal adhesions..........	131 "	21 "	= 16 "
Omental adhesions.........	33 "	11 "	= 33.3 "
Parietal and omental.......	52 "	15 "	= 28.8 "
Intestinal and omental, or parietal and mesenteric.	31 "	14 "	= 45.1 "
Pelvic and intestinal........	22 "	8 "	= 36.4 "
Adhesions to liver or spleen.	2 "	no death.	

From these statistics, omental adhesions are shown to be very important. Adhesions to the liver are a very serious complication, on account of the hæmorrhage, so very difficult to arrest, from the surface whence they have been detached; and intestinal and all pelvic adhesions are very grave complications.

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[1] "Medico-Chirurgical Transactions," vols. xlviii., l., lii., liv.

[2] *The Lancet*, September 7, 1867, and August 20, 1870.

3. **Treatment of the Pedicle.**—That this has an important influence upon the result of ovariotomy, is unquestionable; but we must disabuse ourselves of the idea that any one method is in every instance preferable to all the rest. The attention of operators has been of late too exclusively occupied in seeking the method which shall entirely supersede all the rest; but, up to the present time, that method has not been devised. If it ever is discovered, it will then be seen that other points in the operation still demand improvement as well as this.

That this is not the all-important point, is shown by the fact that experienced operators, who have used the two most approved methods, though so different—some the ligature, and others the clamp—have achieved pretty nearly the same degree of success. Thus, Dr. Clay, who always uses the ligature, has had two hundred and fifty operations,[1] and one hundred and eighty-two recoveries; and Mr. Wells, who uses the clamp by preference, and the ligature and still other methods but very seldom, out of his first two hundred and fifty operations had one hundred and eighty recoveries. Indeed, death has very seldom occurred as a direct consequence of the management of the pedicle, excepting the cases in which its constriction has been incomplete, or the constricting agent, whatever method was adopted, had slipped from its place, and a fatal hæmorrhage ensued. And this has occurred in exceptional cases, after the use of all the methods now in vogue.

I shall discuss the management of the pedicle in a subsequent chapter.

4. **Amount of Hæmorrhage.**—The blood lost during ovariotomy, excepting that from the incision, which can usually be kept within narrow limits,[2] must, of course, proceed from the divided pedicle, or from detached adhesions, or both.

If the former be judiciously treated by any of the most approved methods, the bleeding need not be taken into account at all; since, from the instant the pedicle is constricted, whatever be the method, not a drop of blood can be lost, except from the stump and the tumor. But, if the constriction be not complete, hæmorrhage, at the moment or after the incision is closed, may occur, and may become a cause of death, either as hæmorrhage merely, or by producing peritonitis, or, ultimately, septicæmia.

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[1] Private letter, December, 1871.

[2] Dr. Bayless lost a patient from hæmorrhage from the incision.

But the amount of hæmorrhage from divided adhesions is far less under our control, and may itself determine the result of the operation. Here, however, a slight loss in a strong patient has no perceptible effect, as might be expected. And we can draw no reliable inference from a given amount of hæmorrhage from either source, unless it be clearly excessive, without taking the general condition of the patient into account.

Kœberlé found that the mortality of his cases was directly proportional to the amount of blood lost in the operation. Thus:

1½ oz.	(50 grammes)	of blood lost,	18 cases,	1 died.
3⅛ to 15⅝ “	(100 to 500 “)	“ “	25 “	10 “
15⅝ “ 31¾ “	(500 “ 1,000 “)	“ “	18 “	6 “
31¼ “ 62½ “	(1,000 “ 2,000 “)	“ “	6 “	5 “
Over 62½ “	(over 2,000 “)	“ “	2 “	2 “

It must be admitted that the amount of blood lost in the last twenty-six cases (one pound to even four pounds, and more; five hundred to two thousand grammes, and over) is altogether exceptional; and might well prove fatal of itself to an exhausted patient. I think I have never seen a hæmorrhage exceeding one pound; and, usually, it comes within the limits first mentioned above (one and a half, and three and a half or four ounces), with experienced English and American operators.

But Kœberlé's statement, if not qualified, may mislead. The loss of four ounces or even eight ounces of blood, during the operation, may, in a particular instance, exert a beneficial rather than an injurious influence, provided there is no more oozing of blood after the incision is closed. And, if the oozing does continue, the danger therefrom is in no precise proportion to its amount. Two or three ounces may produce peritonitis or septicæmia in one case as surely as twice these amounts in another.

Since the free hæmorrhage which occurred in about half of

Kœberlé's cases must have proceeded mainly from detached adhesions, it shows that they were either very extensive, or very vascular, or both; and, therefore, also implies an increased risk of subsequent bleeding, and consequent peritonitis and septicæmia, as well as of exhaustion, in case the patient were already much debilitated. And it is only in the last-mentioned class of cases that hæmorrhage, as such, increases the mortality in a direct proportion to the amount of blood lost; and here every precaution should be taken to reduce it to the smallest possible amount.

5. **Duration of the Operation.**—A long duration of the operation, other things being equal, increases the exhaustion and the shock to the nervous system. Still, it must not be believed that the mere prolongation of the operation for a few minutes, or even a half hour, while the patient is in a state of anæsthesia, would determine a fatal result, except in a very debilitated subject. An unavoidable result of a protracted operation is a prolonged exposure of the peritoneal cavity and the abdominal viscera to the atmosphere, and, in some parts, to the contact also of the hands of the operator. There is generally also, in such circumstances, increased violence to the organs in detaching the extensive and firm adhesions which necessitate the delay.

Except, therefore, in a few cases of great previous debility, it is not merely the length of the operation which endangers the patient; and hence, if all the threatened consequences of the adhesions are prevented by the operation, the patient recovers equally well after the most protracted operative procedure. I have removed an ovarian polycyst by an operation which lasted four hours, and which required an additional hour to close the incision and put the patient in her bed. But she rallied promptly, and made a good recovery, though septicæmia occurred on the seventh day, in consequence of oozing from the extensive surface whence the adhesions had been detached.[1] Another case in which I required three hours to remove the cyst also made a very prompt recovery, without any bad symptoms, since no oozing occurred after the incision was closed.

Still, Kœberlé found that in his experience the mortality was directly proportioned to the duration of the operation:

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[1] *American Journal of Medical Sciences*, July, 1864.

Duration,	½ hour,		9 cases,	0 died.
"	1 "		28 "	7 "
"	1½ "		16 "	5 "
"	2 "		11 "	7 "
"	2½ "	and more,	5 "	5 "

Kœberlé, however, mentions that one of the patients who died after an operation lasting two hours, and another after one of over two hours and a half, would not have succumbed, had they not been extremely debilitated. And considering the risk of septicæmia if any oozing occurs after the incision is closed, I should say that any prolongation of the operation, necessary for a complete arrest of the bleeding from the surfaces whence the adhesions have been detached, is justifiable. In the two instances above mentioned, however, death occurred from exhaustion—in four days, and at the end of one month. But since the latter (case lxix.) lost over two pints, and the former (case lvii.) over four pints of blood during the operation, I infer that the exhaustion was really due, not so much to the duration of the operation, as to the loss of blood. I therefore conclude that, if the prolongation of the operation is dangerous, far more so is the closure of the incision before all bleeding is permanently arrested.

6. **The Occurrence of Vomiting**—During the operation this is of little importance, unless there be adhesions of considerable extent, except so far as it causes interruption, and occasions delay. If the latter exist, it may determine an unfavorable result by keeping up the oozing of blood both before and after the incision is closed, from the abrasions whence the adhesions have been detached.

The effects of vomiting, during and after Kœberlé's operations,[1] are shown by the following table:

Of 8	cases of vomiting, with no adhesions,	6 recovered,	2 died.
Of 5	" slight "	5 "	0 "
Of 13	" grave "	4 "	9 "

With which compare his cases in which vomiting did not occur:

Of 12	cases, with no adhesions,	11 recovered,	1 died.
Of 10	" slight "	8 "	2 "
Of 21	" grave "	11 "	10 "

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[1] *Gazette Hebdomadaire*, August, 1868, p. 503.

It is, therefore, especially in cases complicated with grave adhesions, that vomiting is dangerous. Of thirteen cases of death from septicæmia, eight had suffered from the chloroform-vomiting.

And it is in respect to its tendency to produce emesis that chloroform is decidedly objectionable as an anæsthetic in ovariotomy. Though it has been generally used in Great Britain, Dr. Clay doubts, since serious sickness is produced by chloroform both during and after his operations, if it has, on the whole, contributed to his success. Of Dr. Keith's reports of his earlier cases, almost all speak of the duration after the operation of the chloroform-sickness. He has used ether since his fifty-second case, and doubts if, on the whole, chloroform is a boon to mankind. Mr. Wells has, of late, commonly used the bichloride of methyl as an anæsthetic. It contains one equivalent less of chlorine than does chloroform, and is given in the form of spray. Dr. W. L. Atlee uses one part chloroform, liquid measure, to two of ether. Kœberlé uses chloroform. Generally, in this country the pure ether is used, and, I think, answers all the requirements as well as any other anæsthetic, if properly administered, while it is also quite as free from objection as any other. I have never seen it produce vomiting during the operation, excepting in cases where it was administered within two or three hours after taking food, as never should be done; and then with the effect only of promptly evacuating the stomach. I have never seen vomiting produced by it after the operation. I, however, record my protest against keeping a patient continually, during the operation, from the use of any anæsthetic, at the point of narcosis indicated by stertorous breathing, and lividity of the lips and face. It is simply anæsthesia, and not asphyxia, that is required; and I have seen more than one fatal result of ovariotomy in very debilitated subjects, which might fairly be attributed to the reckless use of the anæsthetic. As soon as stertorous respiration is produced, the anæsthetic should be withdrawn, and afterward reapplied so as to keep just short of this symptom. Complete anæsthesia is, in itself, a sufficient approach to death, even in case of a patient not much debilitated; and it is simply unpardonable uselessly to superadd to it another still more dangerous condition.

A case is reported by Dr. Black in which chloroform softened and disorganized the bronchial mucous membrane, and produced death in three days and seventeen hours.[1] And Mr. Holt records an instance in which it produced a fatal collapse, from which the patient did not rally at all.[2]

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[1] *The Lancet*, April, 1857, p. 312.

[2] Ibid., January, 1860, p. 47.

LEEDS SCHOOL OF MEDICINE

CHAPTER V.

OVARIOTOMY; INDICATIONS; CONTRAINDICATIONS; WHEN TO ABANDON THE OPERATION; PROGNOSIS.

SECTION I.

INDICATIONS FOR OVARIOTOMY, AND CONTRAINDICATIONS.

The indications and the contraindications for ovariotomy have been very diversely understood at different epochs in its history. At first, a reasonable suspicion of extensive adhesions, or a very low state of health, was accepted as a contraindication; and, if the former were found on opening the abdominal cavity, the operation was at once abandoned. But such timorous counsels now no longer prevail, and the indications may also be more briefly and precisely stated.

I. *INDICATIONS FOR OVARIOTOMY.*

1. From the view I have taken of the inefficacy, with very rare exceptions, of the other methods of treatment, it follows that, if the diagnosis be perfectly clear, the existence of an ovarian tumor is a presumptive indication for ovariotomy; the time for its performance having arrived when the patient's general health has become somewhat impaired.

2. The proper time having arrived, the following are positive indications for it:

Probable absence of adhesions, and all other complications; no depreciation of health except so far as produced by the ovarian disease; no reason for applying iodine injections, or, the treatment by evacuating the cyst, and leaving it patent; the patient desiring the operation, and being confident of recovery.

Before stating the positive contraindications, I call attention to certain conditions, so regarded by some writers, but not now sanctioned as such, by an accumulated experience.

1. Extensive and strong adhesions are regarded by Fehr as contraindicating ovariotomy. But no amount or kind of adhesions, discoverable before the operation, should now be so understood; though, if extensive and vascular, or pelvic adhesions be discovered on opening the abdomen, they may in very rare instances justify its abandonment. The presumption, therefore, should be that no case is to be abandoned on account of adhesions merely, if possible to overcome them; and the operation should actually be left unfinished only when they clearly necessitate such a prolongation of the operation, or such a loss of blood, or both, as will probably prove fatal in the patient's actual condition.

2. Ascites does not contraindicate ovariotomy, provided it is produced by the ovarian tumor, and is not due to any organic affection of some other organ.

3. Extreme debility should not preclude ovariotomy as a forlorn hope, provided it be due to the ovarian disease alone, and permits some hope that the patient may rally and recover; and she desires the operation, after being made acquainted with the danger.

4. Peritonitis, resulting from the bursting of an ovarian cyst, does not preclude ovariotomy. On the contrary, it should, as a rule, be regarded a reason for its very prompt performance. Mr. Wells has saved several patients under these circumstances. Nor is suppuration of the cyst, with hectic fever, a bar to the performance of the operation (p. 362), even though the contents of the cyst have become putrid.

5. Albuminuria does not contraindicate ovariotomy, unless associated with other signs of Bright's disease, or other organic disease of the kidney; i. e., if no blood, casts, or pus, be present in the urine, it may be a result of renal congestion produced by the pressure of the tumor.

6. A suspicion of cancer of the ovary should not, in a doubtful case, forbid the effort to save the patient by ovariotomy. For, if the case prove to be cancer, life is but slightly abridged at the worst; while, if the disease is found to be non-malignant, the patient may perhaps recover, as has occurred in several such

instances. Therefore, *if there be doubt as to the nature of the ovarian disease, operate.*

7. A previous ovariotomy does not contraindicate the removal of the remaining ovary, if it in turn become the seat of cystic degeneration. This has been twice successfully done by Mr. Wells,[1] and also by Dr. Atlee and others.

8. Valvular disease of the heart is not, necessarily, a contraindication to ovariotomy, as is shown by the recovery of one of Mr. Wells's cases (No. 90).

II. *CONTRAINDICATIONS.*

1. Ovariotomy is contraindicated for the present, that is, it is postponed, by a still perfect state of the general health; by the fact that a non-albuminous fluid has been obtained by tapping; by doubt in respect to the diagnosis; by the coexistence, or the suspicion even, of pregnancy; by a uterine fibroma; by any acute disease, or any results still remaining of such an attack, especially if implicating the pelvis, or any other part of the abdominal cavity.

It is also to be deferred during the prevalence of any epidemic influence, which is found to increase the danger of other surgical operations.

2. Ovariotomy is absolutely contraindicated by rapidly-advancing tuberculosis; by actually recognized cancer of the ovary, or of any other organ; by all organic diseases of the brain, heart, liver, or kidney; by ascites, if produced by either of the three last-mentioned diseases; scrofulous enlargement of mesenteric glands; chronic peritonitis; extreme anæmia, or chlorosis; hectic fever; red tongue with rapid (130 to 140) and feeble pulse; profuse diarrhœa; extreme emaciation and exhaustion, affording no hope of recovery from the shock of the operation; profound lesions of the nervous system; any general skin-disease (I. B. Brown); decided unwillingness to submit to the operation; and despair of recovery.

If the case still remain doubtful, "it should be regarded in the most unfavorable light, and the operation be rejected unless practicable on that hypothesis."[2]

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[1] "Medico-Chirurgical Transactions," vol. xlvi., p. 161, and vol. l., p. 1.

[2] Kœberlé, "De l'Ovariotomie," p. 81, § 14.

But shall we absolutely decline to operate in all of the very unfavorable cases? Certainly not. If the conditions are not such as absolutely to forbid the operation, and the patient, after fully understanding the danger of the operation, entreats us to give her the slight chance there may be of thus prolonging her life, we are not at liberty to refuse to operate; this being done with a full understanding, on the part of all interested, on what grounds it is undertaken. Thus, we shall not have to regret our action, even if we fail; while we will sometimes have the intense happiness of having saved one who was ready to perish.[1] In such circumstances, says Dr. H. Vegas, it would be inhuman to refuse ovariotomy to patients who demand it.[2]

Mr. Wells expresses his rule of action in such cases as follows:

> Is it right to perform such an operation as ovariotomy in unfavorable cases? It may be said that, by doing so, the surgeon not only risks his own reputation, but lowers the operation he performs in the estimation of the profession, and thus lessens the number of favorable cases who might be willing to undergo it, were it not known that one in two, three, or four, who do submit to it, die. It is quite clear that a surgeon who will only operate on very favorable cases, ought to show far better returns than one who consents to stake his own reputation in order to give a dying patient a small chance of recovery; and it may possibly be right to follow the more prudent course. But in a case where a poor woman says, as many have said to me—"I suffer from a disease which must kill me. I cannot live very long. My life must be a life of suffering. If you operate, I know the risk I run; but I *may* be cured and return to my husband and children, and I would rather die than live as I am"—in such a case as this, I do not envy the feelings of a man who—unless he saw the case was absolutely hopeless—would let any consideration for the general character of surgery, or for his own reputation as a successful operator, induce him to refuse the prayer of the poor dying creature who placed her life in his hands.[3]

SECTION II.

UNDER WHAT CIRCUMSTANCES SHOULD OVARIOTOMY BE ABANDONED?

A. If, on opening the abdominal cavity, the tumor is found not to be ovarian, the original plan of operation is of course abandoned, and further proceeding must depend on the nature of the tumor:

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[1] Peaslee's "Monograph on Ovariotomy," p. 66.

[2] "Étude sur les Kystes de l'Ovaire," etc., p. 93.

[3] "Diseases of the Ovaries," p. 81.

1. If it be a solid tumor of the liver, spleen, mesentery, or kidney, or a uterine fibroid, the incision may best be closed without delay. But, if the last-mentioned be sub-peritoneal and pediculated, the question of removing it may be entertained.

2. If it be a cyst, whether of the kidney, spleen, liver, mesentery, or a uterine fibro-cyst, the propriety of evacuating it by tapping should be considered.

Mr. Wells has tapped two renal cysts under these circumstances; the former patient dying in thirty hours, of uræmia,[1] and the latter being, two months afterward, still improving in health.[2] He also tapped a "renal or splenic" cyst, and the patient recovered and remained well.[3] He removed eight pints of sero-purulent fluid from a uterine fibro-cyst, and the patient recovered and remained well.[4]

But a uterine fibro-cyst, attached by a distinct pedicle not over one and a half inch in diameter, may be removed with about the same risk as an ovarian tumor in the same circumstances. I have operated successfully in such a case. If a renal cystoma has involved the entire structure of the kidney, the question of its removal may be raised; though up to the present time the experience of Simon, of Heidelberg, and Dr. J. T. Gilmore, alone sustains the affirmative (p. 158).

3. If the tumor prove to be a cyst of the broad ligament, it should be merely tapped; since generally, as we have seen, a single tapping produces a cure. If, however, it is decidedly pediculated, it may be removed with rather less risk than the average of ovariotomies.

B. If the diagnosis prove to be correct, the only valid reason for abandoning the operation would be the existence of very grave adhesions.

Dr. Herrera Vegas maintains that we are authorized in abandoning ovariotomy when the adhesions are very extensive and resistant, or when they interest important organs, as the bladder, uterus, intestines, etc.[5] He also quotes Dr. J. Clay's table showing that—

If there be no adhesions, thirty per ct. die after ovariotomy.

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[1] "Medico-Chirurgical Transactions," vol. l., p. 518.

[2] Ibid., vol. lii.

[3] Ibid., vol. lii.

[4] Ibid., vol. lii.

[5] "Étude sur les Kystes de l'Ovaire et l'Ovariotomie," p. 94.

If there be weak adhesions, forty per ct. die after ovariotomy.

If there be extensive adhesions, fifty per cent. die after this operation.

If there be extensive adhesions requiring ligatures, seventy per cent. die after it.

On the other hand, he finds that, of eighty-two cases in which the operation had been abandoned on account of adhesions, there had been but twenty-four deaths, or twenty-nine per cent., to offset the seventy per cent. in the cases which had been completed, after detaching and ligating the adhesions.

We are, however, to remember that the seventy-one per cent. who did not die, of the eighty-two in whom the operation was abandoned, did not "recover," as did the thirty per cent. of the cases of adhesions requiring ligatures. They simply regained their condition before the attempt to remove the tumor; while the thirty per cent. regained their health entirely, being freed from the ovarian disease. Besides, the management of adhesions has been much improved since 1860, when Dr. Clay's table was published. Kœberlé had, in August, 1868, in a series of sixty-nine cases, never "resolved upon the cruel extremity of leaving the operation unfinished;"[1] though he had often had to contend with the worst forms of adhesions.

Dr. Keith had abandoned but four cases on account of adhesions, when he had performed one hundred and thirty-six ovariotomies,[2] though there were adhesions in thirty-three of his first fifty cases, and several of the operations occupied over two hours, on account of their extent and gravity. Nussbaum also had adhesions in twenty-nine out of thirty-four cases, and strong adhesions in seventeen cases. He, however, never abandoned a case.

It should, therefore, be the kind, rather than the extent or firmness of the adhesions, that should justify the abandonment of an operation once commenced. And, we may now state the practical rule that only adhesions to the liver, intestines, bladder, or uterus, come within this category. In one of Dr. Keith's successful cases, the cyst adhered almost universally, posteriorly, to the intestines, the aorta, etc.[3] Grenser concludes that, if adhesions exist to the bladder, jejunum, colon, or pelvis—an accident for which art does not provide a sufficient remedy—the operation must be left unfinished.[1]

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[1] *Gazette Hebdomadaire*, Août, 1868, p. 498.

[2] Private correspondence.

[3] Ibid.

But I close with a statement of the cases in which Mr. Wells has been deterred from finishing the operation of ovariotomy since 1865, and which occurred in connection with and in addition to his last three hundred cases. I exclude those in connection with his first hundred cases, since it is my object here to include only the results of his riper experience up to the present time. Since the commencement of the year 1865, Mr. Wells has abandoned the operation, after commencing it, nineteen times, for the following reasons:

No. of Case.	Date.	Age.	Married or single.	Cause of abandonment of operation, and how far proceeded with.	Result.
1	Feb., 1865.	22	Single.	Pelvic adhesions; cyst emptied, and fixed to abdominal wall.	Cured by suppuration.
2	May, "	50	Married.	Pelvic adhesions; loose part of cyst removed by *écraseur*.	Died in seventy hours. Obstructed intestine.
3	Oct., "	40	Single.	Pelvic adhesions; cyst tapped and emptied.	Recovered after suppuration.
4	Ap'il, 1866.	38	Married.	Part of tumor of doubtful origin removed. Uterus and both ovaries diseased.	Died in thirty-two hours. Peritonitis.
5	July, "	40	"	Suppurating cyst opened, and partially removed.	Death in eleven hours. Exhaustion.
6[2]	Dec., "	33	Single.	Cyst tapped. Adhesions extensive; no attempt at removal.	Relieved.
7	Ap'il, 1867.	48	"	Extensive adhesions to pelvis and cæcum	Relieved as from a simple tapping.
8	" "	26	"	Tumor tapped, and one cyst emptied. Vessels in cyst tied, and ligature cut short and returned.	Died nineteenth day after suppuration of the cyst. *Post-mortem* examination showed that tumor could not have been removed.
9	May, "	43	Married.	Cyst opened. Some adhesions to parietes and intestines separated. Two vessels tied, as in preceding case.	Died in fifty-two hours. Uterus, rectum, and both ovaries united; could be separated after death only by careful dissection.
10	May, 1868.	25	Single.	Cyst tapped. Extra strong pelvic adhesions.	Relieved, but died a few weeks afterward.
11	June, "	47	Married.	Part of adherent cyst removed; remainder fixed to opening in abdominal wall.	Died fourth day.
12	Aug., "	33	"	Ruptured cyst. The peritoneal cavity cleansed of ovarian fluid. Adherent dendritic tumor.	Was tapped one and two months after, and was improving in health and flesh at end of five months.
13[3]	Oct., "	33	"	Adhering cyst emptied, and fixed as in case eleven.	Suppuration and recovery. Good health five months after.
14	Feb., 1869.	53	Widow.	As the preceding case.	Died twentieth day.
15	" "	54	Single.	Burst cyst; all fluid removed; cancerous nodules all over the peritonæum.	Died thirtieth day.
16	May, "	34	Married.	Adherent papilloma of both ovaries. Peritoneal fluid removed.	Left hospital twenty-third day after.
17	" "	54	Single.	Part of adherent multilocular cyst removed; adhering pelvic portions left.	Died eighth day.
18	Nov., 1870.	31	Married.	Part of adhering cyst removed; remnant secured by ligature.	Died in twenty-two hours.
19[4]	Dec., "	26	Single.	Cyst emptied, fixed to abdominal wall, and cure obtained by suppuration.	Recovered.

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[1] *Richmond and Louisville Medical Journal*, April, 1871, p. 382.

[2] First six cases reported in "Medico-Chirurgical Transactions," vol. l., p. 548.

[3] Cases seven to thirteen, ibid., vol. lii.

[4] Cases fourteen to nineteen, ibid., vol. liv.

Of Dr. Keith's four unfinished operations, one patient died in twelve days; one after two years; one is still living (1872), after one tapping three years ago; and the fourth recovered after suppuration of the cyst, and drainage. Thus it appears that adhesions were the sole reason for abandoning the operation in all the preceding cases, and pelvic adhesions especially. The great desideratum, therefore, at present is, an improved method of managing them. I shall speak of the various methods in chapter seven.

SECTION III.

PROGNOSIS OF OVARIOTOMY.

Accidents may arise in any case, during or after ovariotomy, which nullify all previous predictions, however apparently well founded; and Scanzoni pronounced it a surgical temerity, since the cases which promise the best results often prove to be the worst. Kœberlé, as a general guide in the prognosis of ovariotomy, divides the cases into three categories.[1] I reverse the order of the last two:

1. Simple, uncomplicated, or slightly complicated cases, in which the general health of the patient is not compromised. In these cases a cure is the rule, and death the exception.

2. Cases which, though complicated, yet present no grave contraindications. Here the chances of cure and of death are about equal.

3. Doubtful, complicated cases, with profound impairment of the general health. In these cases, where the prognosis is grave, the operation can be attempted only as the last chance for the patient; death is the rule, recovery the exception.[2]

Dr. W. L. Atlee arranges the cases in two classes: 1. Those in a condition favorable for any grave surgical operation; and 2. Those whose vital powers are rapidly failing.[3] The prognosis is favorable in the former class, and not so in the latter.

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[1] "De l'Ovariotomie," p. 71.

[2] After an experience of five years as an ovariotomist, Kœberlé remarks that the results of ovariotomy, to be satisfactory, should afford ninety to ninety-five per cent. of cures in cases without adhesions, and seventy to eighty per cent. with slight adhesions (*Gazette Hebdomadaire*, August, 1868, p. 500).

[3] *American Journal of Medical Sciences*, January, 1870, p. 102.

To treat this subject as definitely as possible, I have to consider, first, the elements of prognosis, which are available before the operation; and then those which become known during it.

I. *PROGNOSTIC ELEMENTS AVAILABLE BEFORE THE OPERATION.*

So far as the question of adhesions is concerned, we have to deal, before the operation, with the unforeseen and the unknown. We can have nothing better than a rational presumption respecting them, as founded on the signs specified on page 167; and, whatever ideas we entertain, we must commence the operation prepared to meet with every possible complication.[1]

The following elements are, however, known beforehand; and their prognostic bearing may be stated as follows, in a general way:

1. **Conditions warranting a Favorable Prognosis.**—Slow progress and prolonged duration (two to four years) of the disease; natural condition of the skin;[2] general health somewhat impaired; menses arrested; final cessation of the menses; emaciation slight.

Monocyst, or oligocyst; large size of tumor (middle of third stage); abdominal wall distended and thin; no adhesions suspected; no previous tappings; contents of cyst serous, and of low specific gravity; no previous or concurrent diseases; age under twenty-five, or over fifty-five years; not married; sanguine temperament; cheerful, courageous, but docile disposition. Parents healthy and long-lived. Patient desires the operation, and confidently expects to recover; desirable social position and external circumstances.

2. **Conditions not favorable, but not decidedly the Reverse.**—Delicate constitution; previous diseases; suspected parietal adhesions, if not very extensive, and patient not very debilitated; ascites, depending on the ovarian disease, and patient not much exhausted; several previous tappings of the tumor; albuminuria from mere renal congestion; anasarca, unless produced by serious renal disease; suppuration of the cyst.

3. **Conditions suggesting an Unfavorable Prognosis.**—Recent peritonitis, or important surgical operation, or inflammation within

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[1] Kœberlé, "De l'Ovariotomie," p. 82.

[2] I. B. Brown does not operate with a dry skin.

the pelvis; any general skin-affection; rapid progress of the disease (one to two years); very robust general health; great prostration of same; polycystic tumor; small size (middle of the second to beginning of third stage); thick abdominal walls (one and a half to two inches); extensive and perhaps pelvic adhesions suspected; contents of cyst highly albuminous; decided emaciation and debility; melancholic temperament; desponding, timid, irritable, or indocile patient; she hesitates to consent to the operation, and is doubtful of recovery; undesirable social position; penury; ruptured cyst, and perhaps with peritonitis.

4. **Conditions usually incompatible with a Favorable Result.**—The last degree of emaciation; great prostration, with tongue and pulse as described on page 92; colliquative diarrhœa; tubercular,[1] or cancerous deposit in any part; organic disease of any important organ, Bright's disease especially; patient averse to having the operation performed; utter despair of recovery.

II. *PROGNOSTIC ELEMENTS DEVELOPED DURING THE OPERATION.*

1. The *favorable* are—incision of medium length (not above umbilicus); monocystic or oligocystic tumor; no adhesions, or slight parietal adhesions; pedicle long, and secured with certainty; hæmorrhage very slight, and very certainly arrested; operation of short duration; exposure of peritoneal cavity (less than twenty minutes); no vomiting.

2. The *unfavorable* are: a very long incision (three or four inches above the umbilicus); very short incision (if there be adhesions); polycystic tumor; extensive adhesions, of any form, if also vascular; especially those to intestines, liver, and spleen, and organs in the pelvis; any organs lacerated by force applied to detach adhesions; much hæmorrhage from the latter, and not certainly arrested permanently; pedicle short, and doubt of its being perfectly secured; long duration of operation (an hour or more after opening the abdominal cavity); vomiting, especially if the adhesions are quite vascular. Blood,

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[1] The fact should not be overlooked that pressure of the lungs by a very large cyst may produce symptoms simulating those of tubercular infiltration, as in one of Mr. Wells's cases.

ascitic, or cystic fluid, left in the peritoneal cavity; peritonæum not included in the suture closing the incision. Kœberlé also includes, as an unfavorable element, an inability on the part of the patient to easily eructate gas from the stomach. Grenser states that adhesions to the vessels of the pelvis and to the Douglass[1] *cul-de-sac* are always fatal—a proposition I do not accept in its unqualified form. If the bleeding from detaching them cannot be arrested, of course a fatal result occurs, as is often the case with adhesions detached from the liver. Such adhesions may, therefore, sometimes justify the abandonment of the operation; and, meanwhile, we must devise a better method of treating them.

If the operation is abandoned for any reason, prognostic probabilities of the case may be deduced from the table in the section on that subject (p. 392).

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[1] "De l'Ovariotomie," p. 79.

LEEDS SCHOOL OF MEDICINE

CHAPTER VI.

TREATMENT AND ARRANGEMENTS PREPARATORY FOR OVARIOTOMY; GENERAL REMARKS UPON, AND DESCRIPTION OF, THE OPERATION.

SOME operators undertake the operation without any regard to the circumstances I am about to specify, except, perhaps, that a laxative is given the evening before it; while others insist on points which, to most, would appear frivolous. My own impression is, that, in performing the most formidable operation known to surgery, we are bound to take every possible precaution which commends itself, on rational grounds, against an unfavorable result; and with this view I shall consider separately—1. The preparatory treatment; and 2. The preparatory arrangements at the time of the operation.

SECTION I.

PREPARATORY TREATMENT.

There is a diversity of opinion in regard to the amount and the kind of preparatory treatment. Dr. Krassovsky, of St. Petersburg, thinks that the time spent in endeavoring to improve the patient's condition is generally lost; while others attach much importance, in cases of decided prostration, to a tonic course of treatment for a time before the operation. If the case presents the symptoms of the fourth stage (p. 69), there is no time to be lost in general treatment.

But, if the patient be merely anæmic, or debilitated, and not yet much exhausted by the progress of the disease—there being at the same time no necessity for immediate surgical action—a previous attempt should be made to improve the general condition; and, to this end, tonics, nourishing food, the preparations of iron, frictions of the surface, baths, and passive exercise in the open air, are important. If there be œdema of the abdominal parietes, tapping on the third or fourth day before the operation may be judicious, for the purpose mentioned on p. 347.

It is very important to secure as healthy a condition as possible of the digestive organs; but, if no medication is required for that purpose, I do not think it necessary to make any change in the habits of the patient, excepting to enjoin quiet of mind and body for four or five days, till the morning of the day before the operation. At that time, I have habitually given a full dose of castor-oil in order to secure three or four evacuations of the alimentary canal the day before the operation (expecting no further action for six or seven days after it); and meantime, also, allowing only milk-porridge[1] as nourishment, and securing sleep at all events the night before the operation, by the use of an opiate if required. I prefer the porridge because it agrees with almost every stomach, whatever its condition, and does not occasion any gas in the intestines. Thus they are found collapsed, and do not protrude to give trouble during the operation. Kœberlé administers the subnitrate of bismuth to effect the absorption of the intestinal gases.[2]

Dr. W. L. Atlee administers "the perchloride of iron for ten to fourteen days before the operation; castor-oil on the previous day, and opium the previous night, and again one hour before the operation."[3]

Dr. T. G. Thomas advises the administration of one grain of opium, or its equivalent in some of its preparations, every six hours during the four days preceding the operation.[4]

I. B. Brown suggests a succession of warm baths for a week or ten days before the operation, to secure a more active state of the skin, and to prevent internal congestion. He declines to operate so long as the skin is dry. Dr. Black gave acetate of ammonia for a week previously, with the same view; and twice during that week a powder of hydrarg. cum creta and ox-gall.[5] The temperature of the patient must be reduced, if too high from febrile reaction (101° to 103°), before the operation, unless due to suppuration of the cyst (p. 77); and the urine should also be clear.

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[1] Equal parts of milk and water, boiled one hour, and thickened with flour.

[2] "Opérations d'Ovariotomie," p. 4.

[3] Private letter.

[4] "Diseases of Women," p. 731.

[5] *The Lancet*, October, 1863, p. 548.

SECTION II.

PREPARATORY ARRANGEMENTS.

Having engaged, if possible, a nurse who has had experience in connection with the operation of ovariotomy, we have next to consider the time, the place, state of the atmosphere, the preparation of the apartment, and of the patient herself:

1. The **most favorable time** in the year excludes both the coldest and the hottest season. In regard to the menstrual cycle, the operation should not be performed under four days after it, nor less than eight or ten before it. The best time of day for this and other severe operations is soon after noon; at such time that it may be finished by the daylight, and that reaction may be established before the usual time of sleep for the patient. I prefer the hour of one or two o'clock P. M., both on this account, and because the patient should not have taken any nourishment for four or five hours before the operation. Several of Kœberlé's operations were performed at ten A. M., and Mr. Wells has sometimes operated even at nine A. M.[1]

2. **Place of the Operation.**—The country is more favorable than the city. But a change is often advantageous from the city to the country, or, in the cooler seasons, *vice versa*. If in the city, the operation should be performed at a private residence, a private hospital, or a small public hospital, with arrangements expressly for this operation; but never in a large hospital, unless in a room completely isolated from the rest of the establishment. The want of success of ovariotomy in the large London and Parisian hospitals has been shown not to be due to a want of operative skill, but to the unfavorable influences of the hospital arrangements. This is now so well understood, that no surgeon operates unless the patient is isolated, as just suggested.

Mr. Bryant, of Guy's Hospital, first demonstrated how much can be done even in a large public institution, by imitating, so far as possible, the conditions of a private residence; having thus saved six out of ten patients.[1] In the report of Mr. Bryant's cases to the London Obstetrical Society, in February, 1864, he stated that he excluded the students, and placed those who were admitted to the patients under a sort of quarantine. No visitors were admitted; and a special and intelligent nurse was continually with the patient.

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[1] E. g., case of August 30, 1866.

In the discussion which followed, Mr. I. B. Brown objected to the exclusion of the students, and stated that fifty or sixty spectators witnessed his operations at the "Home," without any ill effects. Mr. Wells maintained that Mr. Bryant's success proved nothing in favor, in a general way, of large public hospitals for ovariotomy, since he had set aside all their peculiar arrangements, and imitated those of the smaller establishments. All the operations were also performed by one operator. Ovariotomy, even more than any other operation, demands an experienced operator, and Mr. Bryant had had better success in his latter than in his first attempts. All the other capital operations would also succeed much better, if managed with the care bestowed by Mr. Bryant upon the cases he had reported.[2]

I also add that the operation must be deferred if there be any contagious disease or any epidemic prevailing in the hospital at the time. Mr. Wells, in the last quarter of 1868, lost ten patients out of twelve in succession; four of them out of five cases at the Samaritan Hospital. Finding that a similar increased mortality was obtaining in the practice of other London surgeons, he refused for a time to operate upon any but the most urgent cases; and then resumed with his usual success.[3]

This last precaution must also be taken, even if the operation be performed in the country; especially if peritonitis, erysipelas, phlebitis, or dysentery, is prevailing, or if the operator had made an autopsy of a patient who died of either of these diseases. Dr. W. T. Smith is of opinion that the peritonitis following ovariotomy is most frequently produced by malarious influences, and not by any thing inherent in the operation itself; and that it is, therefore, preventable to a very great extent. He suggests that it is akin to puerperal fever, and perhaps subject to similar laws.

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[1] "Obstetrical Transactions," vol. vi., pp. 35–63.

[2] Ibid., p. 61.

[3] "Medico-Chirurgical Transactions," vol. lii., p. 205.

3. The **state of the atmosphere** (the weather) at the time should also be considered. The day should be bright and clear—at any rate, not a stormy day, nor, in this latitude, with the wind from the northeast. Dr. F. Bird insisted that the atmosphere of the apartment should be maintained at a temperature of 78° to 80° (Fahr.), and be kept moist, also, by the evaporation of water. Dr. Clay attributes much of his success to these two precautions, and Dr. Atlee also adopts them; while Mr. Wells and Dr. Tanner think them unimportant. I. B. Brown thinks favorably of them, if the operation is to be prolonged—a point we can never settle, however, beforehand. They certainly commend themselves on rational grounds, as elements of success, though not essential in every instance. The peritonæum is naturally warm and moist, and it is difficult to realize that the patient is just as safe if it become cold (even chilled, perhaps), or dry, or both, when the peritoneal cavity is opened.

Mr. Solly, however, thought this precaution of no importance,[1] since it is not possible, in this way, to keep the peritonæum up to its natural temperature of 98°; as if a temperature of 60° is as well, for that membrane, as of 80°, for a half-hour, or even two hours, perhaps. Dr. D. Lloyd Roberts thinks a temperature of 64° is best. I prefer a temperature of at least 75°. But, of course, the high temperature and the moisture are not required before the peritoneal cavity is laid open, nor after the incision is closed; and the air may freely enter the room up to five minutes before the cavity is opened. As soon as the incision is closed, the air is again admitted, and a temperature of but 68° to 70° is to be maintained.

4. **The Apartment.**—This should be large and airy, quiet, and well ventilated. Thorough ventilation is of the utmost importance. Mr. Wells attributed his success very much to the fact that he keeps a window of the room constantly open, after the operation, irrespective of the season of the year.

5. **Artificial Serum.**—Among the arrangements for the operation I also include the artificial serum, first used by me in Feb-

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[1] *London Medical Gazette*, July 17, 1846.

ruary, 1855.[1] It is intended to imitate the natural secretion of the peritonæum, and is kept at a blood-heat, and used to thoroughly moisten the operator's hands before they are introduced into the peritoneal cavity.

6. **Dress of the Patient.**—Before being placed upon the table, the patient is to be warmly dressed in flannel throughout, of course including drawers and stockings. Extra pieces of flannel, and a good supply of towels, basins for warm and cold water, and a tub to receive the fluids, are required for use during the operation.

7. Dr. Simpson describes a **table appropriate to this operation.** We only need a strong one, of proper height, four feet long, and about twenty inches wide, covered with a folded counterpane and an India-rubber cloth, and provided with pillows. I. B. Brown uses flannel blankets to absorb the fluid from the peritoneal cavity, as well as to cover the patient during the operation, if required. Dr. Tyler Smith also uses warm blankets to keep the intestines from protruding during the operation. For the former purpose I consider soft sponges far preferable. Mr. Wells prefers to perform the operation on the same bed which the patient is to occupy after it, in order to avoid all movements which might compromise its success. It is, however, very difficult to prevent the bed from getting wetted by the fluid from the cyst or the peritoneal cavity; and, in this country, I have always seen the patient placed in a bed in the same room, after being removed from the table.

8. In regard to the **instruments and apparatus** to be had in readiness for the operation, different operators differ much. Boinet enumerates them under no less than thirty-six heads.[2] Dr. Atlee, on the contrary, avoiding all parade, is remarkable for performing his operations with a very few instruments. The following should be ready in a complicated case:

Two or three scalpels, or bistouries, with fixed handles.

Dissecting and artery forceps, dressing forceps, hooked forceps; forceps for twisting silver wire, etc.

A grooved director.

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[1] Composed of chloride of sodium, ʒ iv.; albumen (white of eggs), ʒ vi.; water, O iv.—*American Journal of Medical Sciences*, January, 1856, p. 52.

[2] Pages 374–376.

Scissors, straight and curved.

A tenaculum.

Carbolized silk thread for ligatures; silver or iron wire for sutures.

Two trocars, common form; Mr. Wells's trocar.

A clamp, *écraseur*, and actual cautery.

Needles of various kinds, to carry the ligatures and sutures.

Long steel pins for interrupted sutures, if required.

Several fine new sponges, of various sizes, very carefully prepared.

Steel male sound No. 10, to explore for adhesions.

Adhesive plaster (one yard).

Solution of persulphate or perchloride of iron.

Sulphuric ether, chloroform, or bichloride of methyl.

Flannel bandage, and compresses.

Oiled silk or rubber cloth.

Female catheter.

Wire retractors.

Uterine sound.

9. **Station and Duties of Assistants.**—Every preparation being made, the patient is placed upon the table, and the surgeon assigns to each assistant his position, and the part he is expected to perform; and three are needed in most cases, in addition to him who administers the anæsthetic. On one occasion, however, I have seen Mr. Wells operate with but a single assistant. Dr. Krassovsky employs five assistants, and places them as follows:[1]

"The first, near the knife of the operator; on him lies the principal duty. He follows each movement of the surgeon, and fulfils all his orders, as—1. Dries the wound during the incision of the abdominal walls; 2. Places the ligature on bleeding vessels, adhesions, bundles of the omentum; 3. Raises (if necessary) the peritonæum, on its being laid open; 4. On the introduction of the trocar through the cystic walls, he applies and ties the tape;[2] 5. Supports the cyst on its being brought out; 6. Replaces the intestines or omentum in case they fall out; applies the sponge when necessary; 7. Helps to apply sutures to the wound, to dress the latter, etc. He places himself on the left side of the patient, face to face with the operator; near him stands the surgeon's dresser, to whose care are left clean sponges, kept in hot water.

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[1] *Edinburgh Medical Journal*, December, 1867, p. 541. [2] As explained in Sec. III.

"The second supports the abdomen from above. He is placed on the right side of the patient, near her chest, and places both palms of his hands on the abdomen in such a manner that the thumbs lie above the navel, their extremities touching or overlapping each other, and the forefinger parallel to the linea alba. He retains the abdomen and cyst immovable in a given position; this is especially of importance in those cases where the abdomen is not equally distended or the cyst is small. During the evacuation of the cyst, and especially during the extraction of the latter, he watches the falling out of the intestines, and, should this happen, immediately leaves hold and raises the edge of the wound, and the operator or first assistant replaces the viscera. With the removal of the cyst his office finishes.

"The third assistant supports the abdomen from below. He places himself on the left side of the patient, near the pelvis. His offices are seldom required during the incision of the abdominal cavity. In case of any serous fluid escaping on laying open the abdominal cavity, he collects it in a jar or on a sponge. During puncture of the cyst he collects the fluid that runs through the canula of the trocar; his principal office, however, commences when the first assistant is occupied in supporting the extracted sac of the cyst, with the rest of its contents; here he in some way fulfils the duties of the former.

"The fourth superintends the instruments.

"The office of the fifth assistant is to have the cauteries ready in time."

The anæsthetic is now administered, and its effect kept up during the operation within the point of narcosis indicated by stertorous respiration, as I have already insisted.

SECTION III.

GENERAL REMARKS ON THE OPERATION OF OVARIOTOMY.

With the exception of the comparatively very rare, uncomplicated cases, ovariotomy is the most formidable and sometimes the most difficult operation the surgeon ever attempts; and he can never be sure, in advance, that no complications exist. "He who undertakes it," says M. Caternault, "must be on the alert, and hold himself ready for every event. It is here, especially, that he must possess extended anatomical knowledge, a quick and accurate sight, quick conception, a firm resolution, and an imperturbable *sang froid*. For at the moment when you open the abdomen, you step you know not where ; and, be on your guard ! the scene may become the most dramatic, the most frightful, even to those accustomed to witness the most formidable operations of surgery ; and forget not that the least mistake, a simple oversight, may compromise and lose all."[1] "Equally faulty in fact and in tendency," said Mr. Walne, "is the suggestion that the operation itself is necessarily one of easy performance, requiring little anatomical knowledge or skilful surgical adroitness."[2]

Fehr remarks that ovariotomy is not a very difficult operation, but demands presence of mind, calmness, and deliberation.[3] But the most complicated cases require, as Kœberlé remarks, "the greatest coolness, and the most extended surgical knowledge, joined with the greatest dexterity."[4] "The broad principle," says Mr. Southam, "that serious operations should be undertaken only by surgeons who possess in a high degree tact in diagnosis, judgment in the selection of proper subjects for operation, and medical skill in conducting the preliminary and after treatment, of course applies to the measure under consideration."[5] And I have shown that the rigid application of this principle is in no other operation so necessary as in ovariotomy. Dr. Keith remarks that "this is the last operation to be undertaken by any but those whose daily work it is to stop bleeding and close wounds."[6]

I make these quotations for the benefit of those who, though never aspiring to perform the common operations of surgery, are deluded, by the simplicity of this operation and the rapidity of recovery in the most favorable cases, to attempt to play the ovariotomist, and also refer such to the remarks of the father of ovariotomy, on p. 240).

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[1] Boinet, p. 373.

[2] Report of his third case ; *London Medical Gazette*, October 6, 1843, p. 54 ; see also p. 278 of this work.

[3] *Op. cit.*

[4] "De l'Ovariotomie," p. 86.

[5] Report of his second case, *London Medical Gazette*, May 22, 1846, p. 916.

[6] Correspondence, January 22, 1872.

Drs. McDowell, Nathan Smith, Charles Clay, W. L. Atlee, and G. Kimball, Mr. Wells, M. Kœberlé, and Dr. Keith, were all familiar with surgical practice before they performed their first ovariotomy; and the same may be said in general of all who have succeeded in this department of surgery.

But delicacy of manipulation, perfect neatness, cautiousness, and care, are also demanded. Hence many surgeons of experience fail here.

The patient being placed in the proper position, the operation includes the following procedures:

1. Make the incision into the peritoneal cavity.
2. Explore for adhesions.
3. Tap the cyst, if it can thus be much diminished.
4. Detach the adhesions.
5. Constrict the pedicle, and remove the tumor.
6. Examine the other ovary, and treat it as required.
7. Cleanse the peritoneal cavity of blood, or ascitic or cystic fluid.
8. Close the incision.
9. Apply the proper dressings, and place the patient in bed.

Various **positions of the patient** during the operation have been adopted by different operators. Mr. Cæsar Hawkins first placed his patient in a sitting or semi-recumbent position, till the fluid is mostly out of the cyst, and then in the horizontal, to prevent fainting and prolapse of the intestines.[1] It is also adopted by Dr. Tyler Smith, Mr. Bryant, Dr. G. Hewitt, and Speigelberg, on the ground that it favors a free escape of the ovarian fluid. But it also renders almost unavoidable a prolapse of the intestines, which may result fatally, as Grenser has stated;[2] and besides predisposes to syncope, which in a debilitated subject is to be specially guarded against. Nussbaum advocates a lateral, almost abdominal, position.

Far better, in the opinion of almost all operators, is the position upon the back; where I should keep the patient till the moment arrives for lifting the tumor from the abdominal cavity. She is then turned upon the side on which the tumor is attached, when it falls out mainly by its own weight, which must, however, be supported, lest it tear the pedicle, as in the fourth case of Dr. Tyler Smith.[1] Mr. Hutchinson first suggested this change of position; but he turned the patient to the side opposite to the attachment.

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[1] *London Medical Gazette*, October 23, 1846, p. 738.

[2] Page 33.

The operation itself also varies somewhat in its details as performed by different ovariotomists. I shall first rapidly give what I conceive to be the best general method as a whole, being a modification of that of Mr. Wells as stated by Dr. H. Vegas;[2] and shall then discuss each of the successive stages of the operation in detail.

SECTION IV.

GENERAL METHOD OF OPERATION.

1. The incision is made in the median line; may commence just below the umbilicus, and should not terminate more than one and one-half inch above the symphysis pubis. It may be extended upward to the left of the umbilicus and along the median line as far as may be necessary to expose the tumor and detach the adhesions. A large empty cyst may be removed through an incision three inches long, and one of five inches is ample for the removal of very large non-adherent tumors, if each cyst is drawn out separately after being evacuated, or if groups of small cysts are thus withdrawn without being emptied.

2. All bleeding from the incision must be arrested before the peritoneal cavity is opened.

3. If the ovarian tumor is surrounded by ascitic fluid, a certain amount may be allowed to escape; but the tumor should be pressed forward by the assistant in order to retain most of the fluid for the protection of the intestines, to the last moment. If adhesions exist, independently of ascites, between the tumor and the abdominal parietes, they should be carefully separated with the hand while the cyst is yet distended; and with great care not to rupture it. Adhesions to the intestines and the omentum should be left till the cyst is evacuated, and thus the adherent viscera can be seen.

4. As soon as the parietal adhesions are detached, the cyst should be tapped. As the fluid escapes, and the cyst becomes flaccid, the latter should be drawn out by a hook, or upon the

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[1] "Obstetric Transactions," vol. iii., p. 51.

[2] *Op. cit.*, pages 104–108.

canula, or forced out by pressure from the peritoneal cavity, to prevent the fluid from falling into the latter.

5. While the cyst is being drawn out, an assistant also keeps the parietes of the abdomen accurately pressed against it, to prevent the last-mentioned accident, and the viscera from escaping. When the smaller cysts are drawn to the opening, they are evacuated, either by pushing the trocar again through the canula and into them, or, better still, by passing the hand into the cyst first emptied, and crushing them, while the other hand is drawing out the mass.

6. If the latter is solid, or semi-solid, and too large to pass through the incision, it should be carefully elongated, as may be necessary.

7. If, while the tumor is being withdrawn, the omentum, the mesentery, or the intestines, are seen to be adherent to it, the adhesions should be cautiously detached by the fingers, or divided by the scalpel, or by scissors. If the intestine adheres so firmly that it cannot be separated without danger, the adherent portion of the cyst should be cut out, and left attached to the intestine, but its internal secreting membrane should be removed.

8. Every portion of detached omentum should be most carefully examined, to see that no bleeding vessel is returned into the peritoneal cavity. Every portion which seems much altered, or has been torn, should be cut off, and torsion or a ligature be applied to every bleeding vessel. If a ligature is used, the ends may be brought out through the incision, or cut short and left with the omentum. It may include no portion of the latter, except the bleeding vessel—or the whole mass which is to be cut off.

9. When the tumor is entirely withdrawn from the abdominal cavity, it must be carefully supported, or its weight may tear the pedicle, as in Dr. T. Smith's case above alluded to. The pedicle, varying in length and thickness, but always containing blood-vessels of considerable size, is at first conveniently constricted by a temporary clamp, very near its junction with the tumor. Then the tumor may be cut away, care being taken to place the oiled silk and the sponges so as to prevent the ovarian fluid from entering the peritoneal cavity.

10. Next, the edges of the incision are separated, and the opposite ovary is examined. If it be diseased, it is drawn out, its pedicle treated, and the ovary cut away; if not, it is left undisturbed.

11. Next, the pedicle is permanently disposed of. If the clamp already applied does not drag too much, it may be left lying across the incision. But it will sometimes be better to treat the pedicle finally with a ligature, and remove the clamp. Just below the clamp, the pedicle is pierced by a needle armed with a double ligature, and each half of this is tightly tied around one-half of the pedicle. Or, if the pedicle is very broad, it may be tied in more than two portions. The smaller the portion included by each ligature, and the more tightly it is drawn, the more rapid their subsequent separation in case the ligatures are brought out through the incision. After the latter are carefully applied, the clamp is removed, and any remaining portion of the cyst is cut away. But care must be taken to leave enough above the ligature, that it do not slip off.

Instead of the preceding method, the ligature may have been applied at once, instead of the temporary clamp. The various methods of treating the pedicle will be considered in the next chapter. If it be short, some other method than the use of the clamp must be resorted to in every case.

12. Careful search is next made for any bleeding vessel on the surface whence adhesions have been detached, and which must be controlled. Blood, ascitic or cystic fluid, in the abdomen or in the pelvis, should be carefully removed by soft sponges, wet with water at 96° to 98° Fahr. (28° or 29° Cent.).

13. Independently of the manner of treating the pedicle, the incision is finally closed by carrying, through the whole thickness of the abdominal wall, sutures of strong silk, or of wire, one half-inch apart. Each suture should include both the skin and the peritonæum, the former for about half an inch, on each side of the incision, so that, when the opposite surfaces are brought together, two surfaces of peritonæum may be in immediate contact. If the sutures fail to bring the edges of the skin into contact at any point, silk sutures penetrating the skin only may be at those points applied.

14. Compresses are applied to the abdomen (I first apply

adhesive plaster, as explained in the next chapter), and around all a flannel bandage; the patient is washed as required, and placed in a warm bed, between flannel blankets, with a rubber bag, containing hot water, at her feet. It is important to secure a prompt reaction, and to maintain a considerable degree of diaphoresis, for the first three or four days.

CHAPTER VII.

HISTORY AND PRACTICAL DETAILS OF THE SEVERAL STAGES OF THE OPERATION OF OVARIOTOMY.

Although oöphorectomy has been so frequently performed during the past few years, there are still much difference of opinion and diversity of practice in respect to the details of the operation itself. I proceed first to state, as briefly as possible, what has been done; and then to give my own conclusions respecting the operative details, as rationally based upon the aggregate experience of ovariotomists up to the present time.

SECTION I.

THE INCISION.

1. **Its Site.**—It has been shown (p. 237) that the incision, in the first ovariotomy ever performed (1809), was made three inches outside of, and parallel to, the left rectus muscle, and nine inches in length. In his second case, also, Dr. McDowell adopted the same site for his incision; while, in the third, he operated in the linea alba. This was probably done in all his subsequent operations; and, in one performed in 1823, the incision is reported to have extended through its entire length.[1]

Dr. Nathan Smith, as has been stated (p. 241), operated (1821) in the linea alba. Dr. W. L. Atlee, in 1849, made an incision, in a successful case, seventeen inches long, from the symphysis pubis to the crest of the right ilium.[2] Dr. Mercier made an incision nine inches long, from the "lower ribs to the external edge of the rectus muscle."[1] Dr. Dorsey made a transverse incision in the left side, six inches long, in which terminated a vertical incision of eight inches.[2]

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[1] Dr. Bradford's Report, p. 50.

[2] *American Journal of Medical Sciences*, 1849, 1855.

Bühring, of Berlin, in 1843, made, in a fatal case, an incision at the outer border of the external oblique, on the right side, from the false ribs to the crest of the ilium.[3] Dr. Hartmann made an incision five inches long, parallel with Poupart's ligament.[4]

Mr. Lizars, in 1824, in a case of no tumor at all (p. 267), made an incision "parallel with and to the left side of the linea alba, about two inches from the ensiform cartilage, to the crista of the pubes.[5]

Mr. R. C. King, in 1836, made a vertical incision, seven or eight inches long, to the right of the umbilicus, and another, four inches long, extending from this at a right angle toward the spine. No tumor was found, but the patient recovered. In another case he made an incision three inches long in the linea semilunaris of the left side.[6]

At the present time all operate, I think, in the linea alba, with the exception of Dr. H. R. Storer, who prefers to make the incision through one of the recti muscles.[7]

2. **Length of the Incision.**—In the first case of ovariotomy, Dr. McDowell made an incision nine inches long, and operated in a similar manner in the second. In his third case he first made an incision from a point "an inch below the umbilicus to within an inch of the os pubis," and, finding he could not remove the tumor, then prolonged it to the right of and two inches above the umbilicus. He announced the principle of this step of the operation in the following words: "My incisions were always so free and extensive that I always performed every part of the operation by sight."[8] In one of his cases, finding the cyst could not be removed through an incision ex-

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[1] *New Orleans Medical and Surgical Journal*, 1859.

[2] *Ohio Medical and Surgical Journal*, 1859.

[3] "Heilung der Eierstocksgeschwülste," 1848.

[4] *Monatsschrift für Geburtshülfe*, 1856.

[5] *Edinburgh Medical and Surgical Journal*, October, 1824, p. 267.

[6] Referred to by Mr. Wells in "Medico-Chirurgical Transactions," vol. l., p. 554.

[7] *American Journal of Medical Sciences*, January, 1866.

[8] *Eclectic Repertory*, October, 1819, p. 546.

tending from the sternum to the symphysis pubis, he tapped it, and then removed it. This was in 1823. The patient recovered.[1]

Dr. Nathan Smith, in 1821, being unaware that ovariotomy had ever been performed, decided to operate on a case of ovarian cyst as follows:

1. To make an incision three inches long, and expose the cyst.
2. To evacuate it (it having already burst three times), and draw it out through the incision.
3. To ligate the pedicle, remove the cyst, cut the ligatures close to the knots, and close the incision throughout.

This he successfully accomplished on the 5th of July, 1821, and published the case both in this country[2] and in Europe,[3] in 1822.

But neither at home nor abroad was the principle of Dr. Smith's operation appreciated. In this country, however, the medium incision of Dr. McDowell (six to nine inches) was generally adopted, if found sufficiently long, till 1848, when the influence of Dr. Charles Clay in favor of the long incision began to be decidedly felt. Soon, however, the general opinion fell back upon the original idea of Dr. McDowell "to perform every part of the operation by sight," and the use of an incision long enough for that purpose, but after the cyst had been diminished so far as possible by tapping.

In Europe, however, an idea was acted upon at first which did not originate here. Chrysmar, who first performed ovariotomy in Europe, in May, 1819, extended his incisions in his three cases reported by Dr. Hopfer (p. 309) from the sternum to the symphysis pubis. Mr. Lizars, of Edinburgh, who first operated in Great Britain in 1824, did the same. But the former having lost two patients out of three, and the latter having succeeded but once in four cases, as explained on page 268, no further attempt at ovariotomy was again made in Europe till 1832, when Ritter succeeded by the long incision also. In 1834 K. F. Quittenbaum, of Rostock, "made a short incision and tapped the cyst before lifting it out of the abdominal cavity." This was the first time Dr. Nathan Smith's method had been practised in Europe.[1] Quittenbaum's incision was, however, six inches long. In his next case, in 1842, he made an incision of fourteen inches. Both cases recovered.

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[1] Bradford's Report, p. 50.

[2] *American Medical Recorder*, January, 1822.

[3] *Edinburgh Medical and Surgical Journal*, October, 1822.

After 1834, and up to 1850, the incision in Germany was never, with three or four exceptions, more than six inches long, or, sometimes, from the umbilicus to the symphysis pubis, and, in the majority of the cases, it was less than four inches. Langenbeck averaged in his five reported operations only two and three-quarter inches, one incision being six inches, and all the rest two and a quarter inches or less. He saved two of the five cases. This tendency to the very short incision accounts in part for the bad success of ovariotomy in Germany, but has for the last ten years been less apparent. In the first two ovariotomies in France—Woyerkowsky's case in 1844, and Vaullégeard's, 1847—the incisions were (1) from three inches above the umbilicus to the pubes, and (2) seven inches.

In Great Britain, the first ovariotomy, after Dr. Granville's failure, was that of Mr. William Jeaffreson, of Framlingham, on March 4, 1836, when he removed a bilocular cyst through an incision ten to twelve lines long.[2] The same year, also, Mr. R. C. King and Mr. M. J. West operated with incisions three inches and two inches long. Mr. Crisp operated with an incision of one inch, in 1838.

Mr. Jeaffreson states that he himself "thought out the proposition of operating as soon as the cyst pressed firmly against the abdominal walls, and before adhesion had occurred."[3] He also claims, in the *Lancet* for November 18, 1843, first to have recommended the minor operation, though he was familiar with Dr. N. Smith's case.

In 1842 Dr. Charles Clay commenced as an ovariotomist, making the incision in his first case, as did his teacher, Mr. Lizars, from the sternum to the symphysis pubis. In his second case the incision was ten inches long, and in 1846 he reported a case of six inches. His incisions were, however, generally like his first one, and Mr. Walne, who also commenced in 1842, was in accord with Dr. Clay in this respect. Mr. Southam, who sometimes assisted Dr. Clay in his operations, had an incision of nine and of seven inches in his two cases. These three operators and C. Aston Key were the principal champions of the long incision, or "operatio major."

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[1] Grenser incorrectly reports Quittenbaum as the first who treated the cyst in this way. His operation was thirteen years later than that of Dr. N. Smith.

[2] "Transactions of the Provincial Medical Association," vol. v., p. 239.

[3] Ibid.

Dr. F. Bird, who commenced in 1843, sometimes made use of the decidedly short incision, but in his first two it was four inches and nearly six inches long.[1] He was also much in the habit, as has been seen (p. 291), of making exploratory incisions. Mr. Lane made use of incisions of medium length—eight to four inches.

In the controversy, therefore, to which I have already alluded, Dr. Clay, Mr. Walne,[2] and Dr. Waller, were the defenders of the long incision, or "operatio major," while Dr. Bird and Mr. B. Phillips espoused the short incision, or "operatio minor." But Mr. Phillips regarded all incisions as short which did not exceed six inches.[3] Mr. Southam and Mr. Lane took a middle course. Dr. Clay has, however, been misrepresented by the statement that he would always extend the incision from the sternum to the symphysis pubis. I have adduced two instances to disprove this, and he distinctly states that such a cyst as Mr. Jeaffreson's may be removed through a small incision, but he believes that in nine cases out of ten the minor operation would be inadequate.[4] Mr. Southam asserted that "the major operation does not consist in a direct incision from ensiform cartilage to pubes, as Dr. Bird appears to have inferred, but in making an opening proportionate to the size of the solid parts of the tumor, and, when the disease is extensive and wholly or in part fluid, reducing it by paracentesis either previously or during the operation."[5] But both these views of the subject were extreme, and few would hesitate at the present time to adopt Dr. Clay's ideas as an exclusive method rather than Mr. Jeaffreson's, since there should be no doubt that very short incisions are far more dangerous than very long ones. But Dr. Bird was not an extremist on this question; his incisions were usually four to six inches long, as recommended by most operators at the present time. The following suggestions might have prevented the confusion and contradiction which for several years existed in connection with this subject.

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[1] *London Medical Times*, October 16, 1843.

[2] For Mr. Walne's argument, see *American Journal of Medical Sciences*, January, 1844, p. 62; also Pihan Dufeillay, in *Archives de Méd.*, 1862, for a critical review of the whole subject.

[3] "Medico-Chirurgical Transactions," vol. xxvi., p. 480.

[4] *London Medical Times*, October 7, 1843.

[5] Ibid., November 3, 1843.

Making the distinction of (1) very short incision, two and a half inches and less—and such alone was really meant by the operatio minor; (2) short, three to six inches; (3) long, six to ten inches; and (4) very long, ten inches or more—operatio major—their relative danger may be expressed as follows:

Very dangerous.	Less dangerous.	Comparatively safe.	Very safe.
Very short, two and a half inches and less.	Very long, over ten inches.	Long, six to ten inches.	Short, three to six inches.

It was stated by Dr. Waller, at the meeting of the Medical Society of London, December 18, 1843, that Mr. Jeaffreson himself operated six times by his very short incision, and lost five of his patients.[1] Mr. Jeaffreson himself also admits that the long incision of Dr. Clay may be sometimes required, as follows: "Indeed, I would always enlarge the wound should difficulty occur at this period of the operation, rather than make use of violent traction, and, should the case require it, this simple operation might be converted into the formidable one recommended by Dr. Clay."[2] He therefore agrees with Dr. Clay that the minor operation, i. e., his operation, would sometimes "be inadequate."

While, therefore, the conclusion of Mr. Wells (p. 296) is incontrovertible that incisions not extending above the umbilicus are safer than those which do, I also maintain that those less than three inches long are, except in the simplest cases, far more dangerous than those which are longer; and for the following reasons:

a. They do not admit of a thorough exploration for adhesions, or of a cautious detachment of them, if they exist to any important extent.

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[1] *London Medical Times*, December 30, 1843, p. 178.

[2] Ibid., January 14, 1843, p. 255.

b. They do not give space for easy manipulation of the cyst, or management of the pedicle, unless it be long and slender; or for examination of the opposite ovary.

c. They prevent a thorough examination for and arrest of hæmorrhage from detached adhesions; and a careful cleansing of the pelvic cavity from all fluids.

The only alleged advantage of the very short incision to offset all these objections is the assumption, and which has been shown to be unfounded, that an incision of less than three inches into the peritoneal cavity is much less dangerous, merely as a wound, than one of four or five inches. It is only in the very rare case of a monocyst, without adhesions, or any other complication, that the very short incision succeeds. Dr. J. Clay found the success twenty-seven per cent. greater for the long incision;[1] and Dr. Keith states that "his incisions are now longer than formerly, an inch or two more making no difference so far as an increase of danger is concerned."[2] We have already seen the dread of a free incision on the part of German ovariotomists, which accounts for a considerable share of the bad success of ovariotomy in that country.

The practical rule should then be—1. To make the opening into the peritoneal cavity for the removal of the tumor at least three inches long, to begin with—and of course longer in case of large cysts which cannot be essentially diminished by tapping; and, 2. Then to prolong it if necessary, and only so far as is actually required.

But the incision should also terminate below at a point not more than one and a half inch above the os pubis; since, if higher than this, the pedicle will not be easily reached. On the other hand, if it extends lower than just stated, it may divide the fold of the peritonæum reflected anteriorly from the bladder to the abdominal wall.

If the incision is to be extended above the umbilicus, it is to be carried round to the left of the latter, and then into the linea alba again. For the round ligament of the liver passes upward and backward to the right of the umbilicus; and as this was originally the umbilical vein, and in some rare cases remains patent even in the adult, it might in the latter case be wounded, if the incision be carried to the right side. Mr. Wells mentions the fact also that sometimes a subcutaneous vein passes through the umbilicus into the last-mentioned vessel.[1]

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[1] *Op. cit.*, p. cxxx.

[2] Private correspondence, January, 1872.

3. The **layers divided by the incision** are:

1. The skin.

2. The subcutaneous areolar tissue, laden more or less with fat-cells, and therefore of varying thickness.

3. The anterior abdominal aponeurosis—on the middle line, or linea alba.

4. The fascia transversalis, rarely if ever distinguishable during the operation as a distinct layer.

5. The sub-peritoneal areolar tissue, with more or less fat-cells, and of varying thickness.

6. The peritonæum.

4. The **incision is effected** in the manner following:

Since it is intended to make it in the middle line of the abdominal aponeurosis (linea alba), the dark line on the skin, if it exists, is taken as the guide; if not, a line may be drawn from the umbilicus to the symphysis pubis. The incision in the skin should be one inch longer (half inch above and half inch below) than the predetermined opening into the peritoneal cavity; and therefore terminate one inch above the symphysis pubis. It is carried rapidly through the subcutaneous areolar tissue, which is the only layer affording much variation of thickness in different cases; and then, through the abdominal aponeurosis to the extent of not more than two or three lines, on what is taken to be the precise middle line. In the majority of cases it will be found that this opening is not in the middle line, as intended, but penetrates the anterior layer of the sheath of one of the recti muscles. This point is, however, at once decided by passing a probe through the short opening, when, if it enter the sheath of the rectus, it can be passed to the right and left across the muscle; and the point within the sheath nearest the opening, where the probe is arrested, may be taken for the inner edge of the sheath, and thus the precise position of the space between the recti muscles is made out. The incision is next to divide the aponeurosis on this line, when the transversalis fascia is also severed, without being recognized as a distinct layer. Thus the sub-peritoneal areolar tissue is brought into view, with its veins and yellow fat, and varying in thickness from one to three lines. It is very loosely adherent on both surfaces, and when very thin may be mistaken for the peritonæum by the inexperienced operator. This being lifted by a fine tenaculum and divided, the peritoneum only remains. But the latter is not to be divided till all oozing of blood from the vessels already bleeding is arrested. For if blood is allowed to enter the peritoneal cavity, and it is subsequently found necessary to abandon the operation, the former could not be removed, and would, not improbably, lead to a fatal peritonitis or septicæmia. The bleeding vessels (mere veins) may be at once ligated to save time, if torsion does not answer; and the ligatures be subsequently removed when the incision is being closed.

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[1] "Medico-Chirurgical Transactions," vol. l., p. 550.

The peritonæum is recognized if ascites coexists, by being slightly protruded between the lips of the incision through the sub-peritoneal areolar tissue, as a delicate bluish membrane. But in ordinary cases its appearance is less characteristic; and its premature division is indicated by the escape through the incision of a small quantity of the clear secretion of the peritoneal cavity. If, however, too strong pressure is being made at the moment by the assistant, on the sides of the abdomen, the peritonæum lying in folds may be mistaken for adherent omentum, and the operator may thus be led to believe that the peritonæum has already been unintentionally divided. This fact is noted by Mr. Hawkins in his lecture reporting his case.[1] Mr. Wells also mentions a hernia adiposa as being sometimes mistaken for the omentum.[2]

Finally, a small fold of the peritonæum is pinched up by a fine forceps, or caught by a tenaculum, and a small opening made into it by curved scissors—to be enlarged to one inch or more on a grooved director. This last should be done with scissors rather than a knife. I. B. Brown, in one of his cases, found a coil of intestine between the cyst and the parietal peritonæum, and states that he must certainly have injured it had he used a knife.[1] I have myself seen an intestine wounded by want of care in this respect, and the following case is important in this connection :

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[1] *London Medical Gazette*, October 23, 1846, p. 739.

[2] "Medico-Chirurgical Transactions," vol. l., p. 555.

Mr. Christopher Heath, of the London Hospital for Women, reports a case in which a previous attempt at ovariotomy had been made, and where, on enlarging the incision with scissors, an empty coil of intestine which was closely adherent to the abdominal wall was divided in three quarters of its circumference. The cyst was removed with difficulty, the pedicle tied and dropped into position, and the bowel attached to the skin by silk sutures, forming an artificial anus. The incision was closed by wire sutures. Fæces and flatus passed by the artificial anus on the second day, and solid motions *per anum.* The silk sutures were removed on the eleventh day, and the patient was moving about at the end of a month. She made a good recovery, and left the hospital about six months after the operation. Three applications of the actual cautery had been made to the edges of the fistula, but it did not close. A belt and air-pad satisfactorily retained all fecal matter, and she had regular stools.[2]

I advise to divide the peritonæum only to the extent of about an inch to one and a half inch at first ; since this is sufficient for ascertaining whether there be extensive anterior or lateral adhesions, and generally for completing the diagnosis also, if it had been previously doubtful. If complications are discovered which compel the abandonment of the operation, we have, in this way, in effect only made an exploratory incision ; "and every incision should be regarded as exploratory until it enables us to determine whether we are to complete the operation or not."[3] Having decided this point affirmatively, the peritonæum is next divided as already indicated, to the full extent before determined on ; and the next step of the operation is proceeded with.

5. The **tumor, as seen through the opening** in the peritonæum, presents a smooth, glistening surface, but of varying grades of vascularity. In case of a monocyst or oligocyst, it is generally

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[1] *The Lancet*, May, 1863, p. 282. [2] Ibid., March, 1872. [3] "Monograph," p. 72.

of a light, pearly aspect, while polycysts usually present a very vascular surface. In the former variety, also, the cyst is firmer, and more resistant to the touch. It might seem that the peritonæum ought never to be mistaken for the cyst, nor *vice versa;* but both these mistakes have been made. The bluish peritonæum has, when protruding like a thin-walled cyst between the lips of the incision, as before described, been mistaken for an adherent ovarian cyst, and been detached to a greater or less extent by Dusch, Spiegelberg, Dr. Tyler Smith,[1] Wagner, and others. Indeed, such a mistake cannot be avoided without the greatest care, if the peritonæum is adherent to the cyst at the point of incision, or if chronic inflammatory thickening be complicated with ascites. Spiegelberg's case, in which he had extensively separated the peritonæum from its natural attachments to the sub-peritoneal layer, terminated fatally in sixty hours. Three abscesses were found between the skin and the aponeurosis, and two more between the latter and the peritonæum, all of the size of a hazel-nut, and filled with normal pus;[2] but the separated peritonæum was found already united to the abdominal wall. I have, however, seen the peritonæum detached under similar circumstances, over a surface two inches long by one broad, and in a successful case. On the other hand, Spiegelberg, in 1853, cut down to an ovarian cyst, which, being adherent in the line of the incision, was mistaken for the peritonæum, and opened by him—into the peritoneal cavity, as he supposed. He then evacuated the fluid, believing it to be ascitic; though he did not find any intestines in the cavity laid open. The wound was closed; and when the patient died, after repeated tappings, an ovarian cyst was found adhering so closely to the parietal peritonæum as to be inseparable from it.[3] Mr. Wells also mistook a thickened peritonæum for the cyst, which had burst and receded after pouring its fluid into the peritoneal cavity (Case 81).

I should give the rule of practice in such cases, thus: If there be doubt whether the peritonæum has been divided or not, proceed as if it had *not.* For, in that case, the division of the next layer will settle the question; the tumor coming into view if the peritonæum had not been previously divided—and the ovarian fluid escaping if the cyst-wall was the last divided layer. Or if the peritonæum had not been previously divided, and if, ascites coexisting, its division lets the ascitic fluid escape—the sound at once decides in this case, as in the preceding, whether the cyst or the peritoneal cavity, alone, has been opened. If adhesions exist at the point of incision, rendering the cyst inseparable from the peritonæum, as in Spiegelberg's case, the sound should show that the cyst-wall, as well as the peritonæum, has been divided.

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[1] Second case, recovered. "Obstetrical Transactions," vol. iii., p. 46.

[2] Grenser, p. 35.

[3] *Monatsschrift für Geburtshülfe*, B. 14.

6. In case of **a second ovariotomy on a patient,** the incision must not be made in the old cicatrix. Mr. Wells found the union very slow and imperfect in his first case, in which he made the incision very near the cicatrix; and therefore, in his second case, he made it one and a half inch to the right of the cicatrix, through the rectus muscle. Three arteries, one of considerable size, were divided near the lower end of the incision, beneath the divided muscle, and were tied before the peritonæum was opened. "The incision, five inches long, extended from an inch above the level of the umbilicus to a point half an inch above that of the end of the cicatrix. . . . The pedicle of the tumor removed by the first operation, passing from the left side of the uterus," adhered firmly to the lower angle of the cicatrix "in the middle line of the abdominal wall."[1] Dr. Caswell (p. 363) cut one line to the right of the cicatrix of the first operation, and found the latter adherent by a very broad band to a fold of intestine. "Had I cut in the cicatrix," he remarks, "I should have unintentionally performed enterotomy, or have been obliged to abandon the operation."[2]

7. If the case be complicated by an **umbilical hernia,** the plan of operation should generally include its radical cure; and to this end the incision must extend upward to the hernial sac, and then circumscribe the whole of the latter in an ellipse. After the tumor is removed, the whole incision is closed in the middle line. Kœberlé has several times succeeded in this way;[3] Dr. Emmet and Dr. Thomas, of the New York State Woman's Hospital, have also each had a single case.

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[1] "Medico-Chirurgical Transactions," vol. l., p. 6.

[2] Private correspondence, June 12, 1871.

[3] "Opérations d'Ovariotomie, p. 20, note, and p. 91.

I also add that the adherent omentum is sometimes found spread over the front of the cyst down to the site of the first incision, though it does not generally descend below the umbilicus. It is at once identified by its great vascularity, which, together with its thickness, increases from below upward. The rare cases of remarkable thickness, vascularity, and looseness of attachment of the peritoneal investment of the cyst, which have been described on page 34, can scarcely be mistaken for any other condition by one who is aware of the fact that such cases may occur.

SECTION II.

EXPLORING FOR ADHESIONS, AND EVACUATING THE CYST.

An opening having been made as explained in the preceding section, one inch to one and a half inch long, into the peritoneal cavity, the next points to be determined are, whether there be any adhesions, and whether the tumor is actually ovarian, as has been to this moment supposed:

1. Since 1856 I have used, to **ascertain the existence and extent of adhesions**, a number nine or ten steel male sound. This glides easily over the surface of the tumor if not adherent, and, on account of its bluntness and smoothness, can do no harm if carefully used; while its weight and solidity give an accurate tactile perception of the surface with which it comes in contact. It at once detects adhesions on the anterior and lateral aspects of the tumor; while posterior and especially pelvic adhesions can be accurately appreciated only after the cyst is partially or entirely evacuated. It is more judicious not to break down any adhesions felt by the sound, at this stage, since it is not yet to be regarded as certain, if there be adhesions, that the operation will not be abandoned. On the other hand, however, no amount of adhesions could be discovered up to this time which would of themselves justify its abandonment; and, if no other cause be discovered, the incision may now be enlarged, and the cyst evacuated, with the expectation of completing it.

2. But further exploration in these circumstances may demonstrate that **the tumor is not ovarian.** The steel sound sweeping below its lower extremity may prove it to be hepatic, me-

senteric, or splenic; the exploring trocar may obtain a fluid characteristic of the serous cyst of the broad ligament; or the uterine sound, passed to the fundus uteri, while the finger also reaches the latter through the abdominal incision, may show that the tumor is uterine. In either of these cases the proposed operation is arrested here. If the case be one of hepatic, mesenteric, or splenic cyst, the question of tapping it is to be considered; if of a serous cyst of the broad ligament, tapping alone may suffice, or the removal of a portion of the cyst-wall, as frequently practised by Dr. W. L. Atlee. If, however, it has already refilled after tapping, its removal may be regarded as judicious. Finally, if the case prove to be one of uterine fibroma, or fibro-cystoma, the feasibility, usually very improbable, of its removal is to be considered. If the tumor, though ovarian, clearly cannot be removed, the incision may be at once closed; or the case treated by Dr. Noeggerath's method (p. 220), or as similar cases have been managed by Mr. Wells (p. 392).

If the diagnostic results obtained by the exploratory incision through the peritonæum be satisfactory, the former is next enlarged to three inches at least, as before explained, and the cyst is tapped, after all bleeding from the enlargement of the incision is arrested.

3. Various **instruments** have been devised for **evacuating the cyst**, to all the rest of which I prefer the simple trocar of various sizes (three to five lines in diameter), and five inches long. Mr. J. Hutchinson, of the Metropolitan Free Hospital, proposed a siphon-trocar in 1858, "at least three times the usual size, and armed with an India-rubber tube to allow of the fluid being conducted away into a receptacle upon the floor."[1] Mr. Wells has made an improvement upon it which gives it his name. The latter (Fig. 38), after being plunged into the cyst, is fixed to its walls by the wings, and the fluid flows through a rubber tube attached to the end of the canula. It consists of a steel canula a half inch or more in diameter, cut off obliquely at its distal extremity, and brought to an edge; to which a rubber tube is laterally attached, to conduct off the fluid. I have in the hands of more than one operator seen it prove a murderous instrument, since, as it cuts a large disk out of the

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[1] *London Medical Times and Gazette*, October 23, 1858, p. 434.

wall of the cyst, the opening cannot be accurately closed, and the operation must therefore be proceeded with, even though the state of the case is subsequently found to forbid it. It, however, secures a rapid evacuation of the cyst, whenever that is desirable.

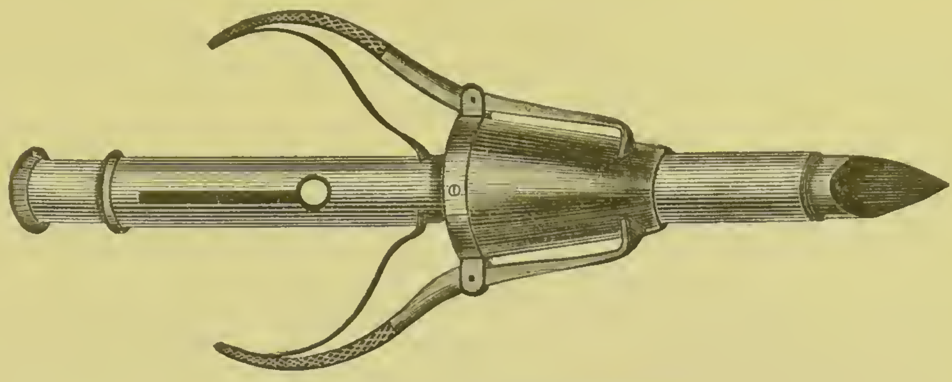

FIG. 38.—MR. T. S. WELLS'S TROCAR.

Dr. J. Ewing Mears, of Philadelphia, has also proposed a trocar and canula for use in ovariotomy (Fig. 39).

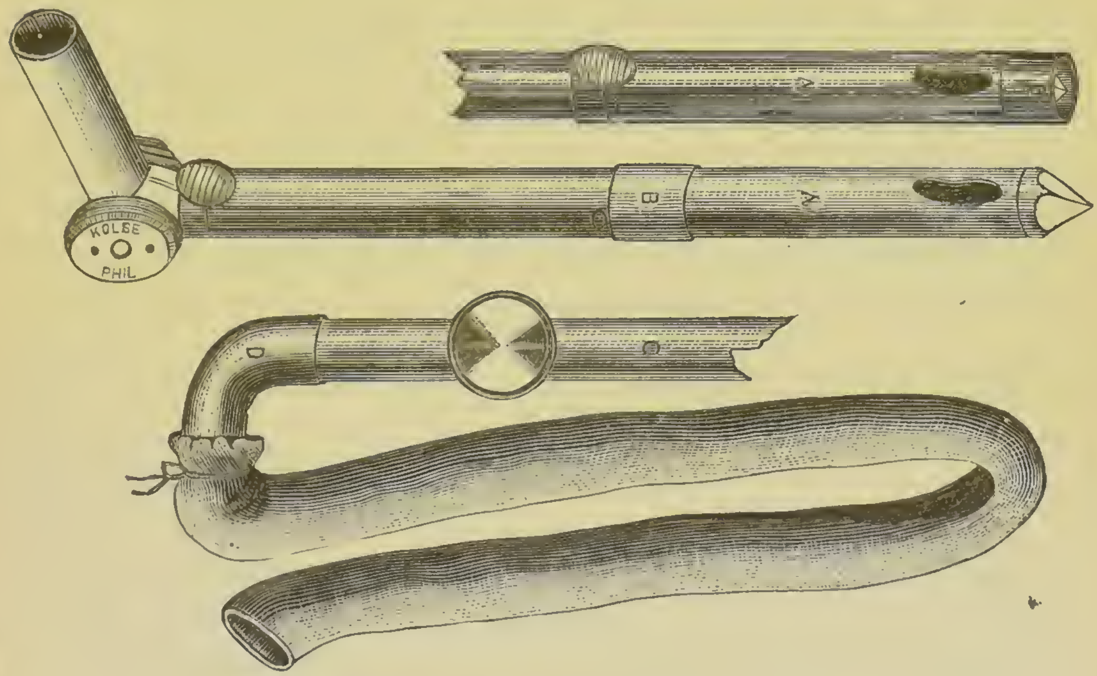

FIG. 39.—DR. J. E. MEARS'S TROCAR.

It consists essentially of a canula (A), armed with a trocar point, which can be covered by a guard (B), with a valve controlled by a hinge-joint, and a flexible tube (rubber) of sufficient length attached to a metallic neck (D).

The diameter of the canula is seven-sixteenths of an inch, and is made this size in order to afford an easy and rapid flow to the viscid gelatinous fluids usually found in ovarian cysts. Immediately behind the trocar-point is an elliptical opening, corresponding in size to the diameter of the canula, through which the fluid passes into the canula. The guard is moved by a rod which is attached to a ring, and adapts itself closely to the surface of the instrument. The valve is controlled by a hinge-joint, and is open when the joint is turned in the direction parallel with the long axis of the canula. This form of valve was adopted in order that the calibre of the canula should be preserved throughout. The flexible-tube is made of the fine rubber cloth, and should have a diameter of not less than one inch. The ordinary rubber tubing is too heavy and unwieldy.

The central figure represents the instrument in the position for introduction, the point unguarded, and the valve closed. The closure of the valve by turning the joint in the direction perpendicular to the long axis of the canula forms a handle, as it were, by means of which the instrument can be firmly grasped by the operator. When introduction has been effected, the guard is projected to cover the trocar-point, the tube attached, and the valve opened as represented in the upper and lower figures.

The guard was adapted to the instrument in order to avoid a possible accident in the wounding, by the trocar-point, of any vessels which might run on the internal surface of the cyst, and also to render the instrument available in cases of non-cystic dropsies, ascites, etc.

The absence of the shoulder, produced by the canula in the ordinary trocar and canula, gives a much greater facility in introduction. An additional advantage may be mentioned in connection with its use in multilocular ovarian tumors, in the readiness with which the secondary cysts can be punctured, and their contents evacuated.

If the simple trocar be used, a rubber tube three-fourths of an inch in diameter, or a somewhat larger one, made of oiled silk, is applied over the end of the instrument, to conduct the fluid into the receiving vessel. Whatever instrument be used, none of the ovarian fluid must be allowed to fall into the peritoneal cavity.

It should be a rule in practice, "always to use a small trocar (three or four lines in diameter), for commencing the evacuation of the cyst, provided the question of removal is not yet fully decided; so that, in case it is found necessary to abandon the operation after the tapping, the puncture can easily be closed by a silk suture, cut short. If a very large instrument be used, and the tumor left, the fluid may, as already explained, still continue to flow into the peritoneal cavity (a large trocar, also, sometimes producing copious hæmorrhage), after the incision is closed—with a fatal result."[1] But, when it is fully decided to remove the cyst, a larger instrument may be used if judged better; though even then, in cases of great prostration, the large instrument should be entirely rejected, and the evacuation of the cyst be more gradually effected.

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[1] "Monograph on Ovariotomy," p. 72.

4. **The place for the introduction of the trocar** should be a point on the cyst-wall where there are but very few and very small vessels, and as near as possible to the upper angle of the incision; since the instrument will, of course, descend as the cyst is evacuated. During the evacuation an assistant keeps up a steady pressure with both hands upon the sides of the abdomen, to favor the flow of the fluid, and to prevent a suddenly-diminished pressure upon the internal organs from its escape, and consequent vomiting or syncope. This is a very important precaution in case of a much debilitated patient, since, with such, syncope may prove at once fatal. From such patients, also, the fluid must not be allowed to flow too rapidly, and is best drawn, therefore, through a small canula, as above suggested. The importance of guarding against vomiting, in case extensive adhesions exist, has already been shown; and I therefore urge the use of a small instrument in this condition also.

The cyst is prevented from falling back into the peritoneal cavity when nearly evacuated, by seizing it with a hooked forceps. But, until the removal of the cyst is positively decided upon, no instrument besides the trocar should be allowed to make any, even the least, wound on its surface.

In case of a polycyst, it is desirable to tap the other cysts, if possible, by reintroducing the trocar into the canula without withdrawing the latter from the first-evacuated cyst; and thrusting it onward into the next one, and so on, until this part of the operation is completed. Thus the fluid from all sources is made to flow through the canula in the original puncture, without any danger of its falling into the peritoneal cavity. This proceeding necessitates the length of trocar and canula I have recommended. If, however, additional cysts are discovered at a later stage, and after the first has been partially turned out of the abdominal cavity, the one already evacuated may be ruptured, and the hand introduced within it to break up and evacuate the remaining ones.

If adhesions exist, some of them may be detached before the evacuation of the cyst, and others during or after this is effected, as will next be shown.

SECTION III.

MANAGEMENT OF ADHESIONS; EXTRACTION OF THE CYST.

I. The **management of adhesions,** when extensive, very vascular, or located in the pelvis, requires more care, judgment, and patience, and often more skill, than any other stage of the operation of ovariotomy; while at the same time it determines the result of the operation to a greater extent than any other, the management of the pedicle not excepted. This fact cannot be made too prominent; since up to the present time such paramount importance has been attached to the last-mentioned point; and I have to consider:

A. The detachment of the adhesions.

B. The arrest of the consequent hæmorrhage.

a. The *time* for the detachment of the adhesions, relatively to the evacuation of the cyst, varies with their character and extent. If the case be one of monocyst, and the adhesions very slight, and not vascular, they may be broken down by the steel sound during the exploration. But it is usually necessary also to introduce the hand to explore the adhesions, if very extensive and probably vascular; and, to do this with facility, the cyst must be sufficiently collapsed. The hand should be moistened with the artificial serum (p. 402), or with water, at 98° (Fahr.), before its introduction. Generally, however, no adhesions should be intentionally detached till the cyst is partially evacuated; and none but parietal adhesions should be detached till the cyst is nearly or entirely emptied. Posterior and pelvic adhesions can sometimes be most conveniently separated during the extraction of the cyst.

b. The detachment may be effected by the steel sound, the hand, scissors, the *écraseur*, or the actual cautery. Dr. Krassovsky, however, remarks that "the *écraseur* has not proved to be quite convenient for this purpose,"[1] and I know of no circumstances in which it is to be preferred. The sound is also adapted only to the most recent and delicate parietal adhesions.

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[1] *Edinburgh Medical Journal*, December, 1867, p. 544.

The fingers of the surgeon are the most reliable instruments for detaching parietal or omental adhesions, and all others which afford a certain length. And the main precaution to be taken is, to detach them from the surface of the cyst, and not from the peritonæum; for thus the bleeding vessels may be easily controlled, as they hang from the peritoneal surface. Besides, torn vessels frequently do not bleed at all, though the same would bleed if cut. Care must be taken at the same time not to rupture the cyst itself. This manœuvre requires much care in difficult cases, and occasions much loss of time. In case, however, of adhesions to the intestines or any pelvic organs, the scissors are less liable to injure the attached organ than the fingers. The knife is not to be used, since it produces a greater flow of blood than the scissors. The actual cautery is used by some operators, not because it detaches the adhesions more safely than the preceding methods, but because no hæmorrhage follows its use. The same may also be remarked of the galvano-caustic of various forms as recommended by Speigelberg;[1] and to the latter, since no foreign particles are left behind, there is no objection. But the actual cautery does leave some amount of oxide of iron, in contact with the tissues burned, and is, therefore, not a safer method of arresting the hæmorrhage than the use of fine ligatures, applied as explained in a subsequent paragraph.

The amount of force necessary to overcome the firmest adhesions is in some cases too great to be safely applied. Nussbaum, who never abandoned a case on their account, in his sixth case introduced his hand into a cyst, and applied his whole strength in tearing it away from its adhesions to the promontory of the sacrum, by inverting it. The patient recovered. His twenty-third case died nine hours after similar treatment.[2]

In the following three categories the detachment of adhesions requires very great care and cautiousness:

1. If the tumor is demonstrably adherent in and throughout the line of the incision, and it is found to be difficult to separate it from the parietal peritonæum, the wound may be extended upward an inch or more with the hope of thus reaching a point on the cyst above the adhesions. This failing, and also an

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[1] Grenser, p. 35.

[2] Ibid., p. 70.

attempt to get the steel sound into the peritoneal cavity from the lower angle of the incision, the latter may be still farther prolonged toward the sternum to the required height, rather than apply much force in separating the cyst on each side of the wound. For the sound, once having passed above or below the parietal adhesions into the peritoneal cavity, easily sweeps around them and separates them to the middle line. Mr. Wells sometimes works in such cases in small cuts with an Adams hook.

2. If the cyst prove to be very intimately adherent to the intestines, the liver, spleen, uterus, bladder, or ureter, it should not be detached at all; but the peritoneal covering should be separated from the fibrous layer of the cyst, and all the adherent portion left in contact with the viscus to which it is attached, as Dr. W. L. Atlee has practised for many years past.[1] In his two hundred and fifteenth case, adhesions seven or eight inches long were thus left attached to the transverse colon.[2]

3. Cases in which the lower portion of the cyst occupies the whole pelvis, and is everywhere adherent to the contiguous organs, have generally been abandoned. But even these will, I think, generally be found to be manageable by the following method, first suggested for the treatment of the pedicle by Dr. T. F. Miner, of Buffalo: Detach the peritoneal coat completely around the cyst at a level two or three inches above the attachments; insert the fingers, and carefully enucleate the portion of the cyst which lies in the pelvis, so as to leave the whole of the peritoneal investment undisturbed in its acquired connections with the contiguous organs. I have succeeded by this method in a single instance of the kind, and have seen Dr. T. G. Thomas do the same. Considerable hæmorrhage will probably result, to be managed as next to be explained.

B. **Arrest of Hæmorrhage.**—There may be no hæmorrhage to arrest if the adhesions are torn by the fingers, as explained, or burnt off by the actual cautery, or the galvano-caustic method. I have stated my objections to the cautery, and should rely mainly upon the ligature. And if the adhesion is in the form of a band, and evidently contains vessels which will bleed freely on being divided, it is better to ligate the band before the division is made. I have seen an artery in an omental adhesion as large as the brachial, and advise, in all cases where the adhesions are of the proper form, to pass a double silk ligature as fine as will still possess the requisite strength, through their middle, and with each half of the ligature tie one-half of the adhesion. The ends of the ligatures may be brought out through the incision, if very near it; or, if not, they may be cut close to the knot and left in the peritoneal cavity. I had a case, in 1863,[1] in which I left fifteen ligatures thus cut short, and which have never given any trouble up to the present time, the patient having constantly enjoyed excellent health. Dr. Keith, in one of his successful cases, left the ends of at least thirty ligatures in the peritoneal cavity.[2] Some prefer the silver wire to the silk thread for ligatures. I object to the former, since it must be tightened by twisting; which is very well for a suture, but not reliable for a ligature. For the smaller vessels torsion may suffice.

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[1] Peaslee's "Monograph," p. 74; and Dr. Atlee's case, No. 205, *American Journal of Medical Sciences*, April, 1870, p. 373.

[2] *American Journal of Medical Sciences*, April, 1871, p. 399.

There is, therefore, no valid objection to the application of silk ligatures to adhesions, whenever and wherever required. Of late, however, I have used them after having been kept for a time in a solution of carbolic acid,[3] and then dried. But vessels not seldom bleed which cannot be constricted by a ligature, as in case of the inferior surface of the liver, or the fundus uteri, or the bladder, the adhesions having been unintentionally torn from the surface of these organs instead of being left there attached as above explained. In such cases I have succeeded by adopting Kœberlé's plan of dropping a minim or less of the solution of persulphate of iron upon the end of the finger, and applying the latter with slight pressure for two or three minutes to the bleeding point, or surface. If the course of the vessel can be seen in case of the uterus and the bladder, a small needle may carry a very fine ligature under it, and thus the bleeding may be controlled.

In case the hæmorrhage comes from a surface whence the peritonæum itself has been detached, the incision is to be opened to the utmost by Pinkham's wire retractors, Fig. 40, so that the source of the bleeding can be seen; and pressure and exposure to the air failing, the direction of the bleeding vessel must be ascertained by the effects of pressure at various points around the bleeding point, and a fine ligature be used, as directed in the preceding paragraph. Or, perhaps, the bleeding surface itself may be gathered up by a forceps, and a ligature be applied around a mass containing the opened vessel. Kœberlé has, in such a case, after ascertaining the direction whence the bleeding came, made a slight incision in the tissues near the bleeding point with scissors, and then raised the small mass containing the vessel and ligated it.[1] I have arrested obstinate bleeding from a surface whence the peritonæum had been torn in detaching adhesions, by gathering up a fold of the abdominal wall (it being very thin), including the bleeding surface, and passing wire sutures through this fold, so as to keep two portions of the bleeding surface in contact. The ligatures were removed on the third day. Mr. Wells, in his eighty-eighth case,[2] passed a silk ligature twice from within the abdominal cavity through its wall, so as to cross the bleeding vessel, and tied it outside over a pledget of lint. Dr. G. Kimball, of Lowell, Massachusetts, has adopted the following procedure to arrest the bleeding from an extensive surface, whence parietal adhesions had been separated:

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[1] *American Journal of Medical Sciences*, July, 1864, p. 50.

[2] *Edinburgh Medical Journal*, December, 1867, p. 525.

[3] Four grains to one ounce of water.

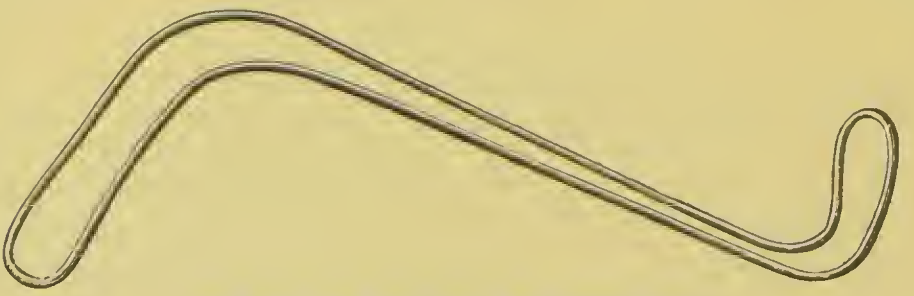

FIG. 40.—DR. PINKHAM'S WIRE RETRACTOR.

> He closed up the abdomen in such a manner as to entirely *exclude* that portion of the parietes from which blood was flowing—literally turning it inside out; and then, with the bleeding surfaces wholly everted, bringing the parietal walls together at a point where the peritonæum was in a perfectly sound state.

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[1] "Opérations d'Ovariotomie," p. 139, note.

[2] *Op. cit.*, p. 227.

To do this effectually, it was necessary to resort to the *quilled suture;* in the present case, however, substituting for quills two cylindrical pieces of wood, ten inches in length, and a third of an inch in diameter. These, with the broad, everted lips held firmly between them, were held in position by six through-and-through sutures. To complete the operation, it only remained to bring together the everted lips, carefully adjusting them face to face, and finally securing their free edges with eight or ten superficial stitches. By this simple arrangement, the abdominal cavity was not only made to correspond, as to capacity, more nearly to its natural condition, but it was also rendered comparatively secure against inflammation and all danger consequent upon future bleeding. In short, the case was made to resemble, to all intents and purposes, one of a perfectly uncomplicated and simple character, and consequently most favorable for recovery.[1]

In all the preceding cases the actual cautery may be the final resort.

Omental adhesions demand the most careful handling, since the omentum itself is so easily torn at any point. As a general rule, it is better to tie the adherent portion *en masse*, by a double ligature an inch or more above the adhesions, before the latter are detached. It is then separated with the utmost care, drawn out through the incision, and laid upon the surface of the abdomen, that any vessels still bleeding cannot fail to be seen. The ligatures may be cut short, or brought out through the incision. I prefer the former method. I have advised to tie the adherent omental band *en masse*, because it is scarcely possible for the surgeon to be certain of controlling the hæmorrhage if the vessels are separately tied. In a case of operation by myself, in 1859, I not only tied all bleeding vessels, but also waited twenty minutes to observe any further oozing of blood, before I closed the incision. The patient died on the twelfth day, of septicæmia, resulting from the decomposition of about two ounces of blood, which had doubtless very slowly escaped from the omental vessels, but which did not bleed so long as they were exposed to the air. All the shreds and loose portions of the omentum should be trimmed off up to within one-half to three-fourths of an inch of the ligatures, before it is replaced. Thus treated, omental adhesions may turn out to be "of no special importance," as one distinguished ovariotomist remarks;

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[1] *Boston Medical and Surgical Journal*, September 17, 1868, and *New York Medical Journal*, May, 1869, p. 175.

while, if carelessly managed, they often prove to be a very grave complication.

Gusserow, in one instance, left the omentum protruding through the upper angle of the wound, where it shrunk and receded into the peritoneal cavity in nineteen days.[1]

Finally, it may be very difficult to arrest the hæmorrhage in case the peritoneal layer of the cyst is peeled off from the fibrous coat and left adhering in the pelvis, as directed in a previous paragraph. Here ligatures and the persulphate of iron must be relied upon. But, as there will almost certainly be some oozing after the incision is closed, it is judicious to leave a bougie passing up the vagina, and through the roof of the latter and the Douglas *cul-de-sac* into the peritoneal cavity, as first practised by myself in February, 1855.[2] Through this the blood may escape, and injections may be made, to cleanse the peritoneal cavity should signs of septicæmia supervene. Dr. T. G. Thomas remarks upon this point:

> The pouch thus left sometimes fills with blood, which being confined to it, and not entering the peritonæum, presents an odd and puzzling appearance. By such a tumor, I was once much puzzled and delayed, until one of my assistants suggested the true explanation of it. In another case in which I practised this method, a fatal issue occurred in this way: The patient did well until the eighteenth day, when, becoming angry, she jumped from her bed, struck violently at an attendant, fell back, and was dead in an hour and a half. An autopsy revealed the fact that the pouch left by enucleation was filled with a fetid, grumous mass of blood. The effort made by the patient caused a rupture of this sac and escape of its contents into the peritonæum, which produced death from collapse. This danger could be avoided by thorough checking of all oozing of blood by persulphate of iron before ligating the mouth of the sac, or by leaving within it a silver catheter, and ligating the neck around this, and securing it by pins in the wound. By this means antiseptic injection could be regularly practised.[3]

II. **Extraction of the Cyst.**—The cyst is usually turned out of the abdominal cavity with facility, after the adhesions are overcome; but the following preparation for it will be found very convenient: Instead of withdrawing the canula, reintroduce the trocar, and then force the instrument out through the cyst-wall at a point three or four inches from that of its entrance; withdraw the trocar, and tie the canula in place by means of a strong tape or ligature passed round the cyst below the canula. Thus a sort of handle is given to the cyst for its extraction, and no fluid can escape from the latter during the necessary manipulations.

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[1] Grenser, *op. cit.*, p. 36.

[2] *American Journal of Medical Sciences*, January, 1856, p. 53.

[3] "Diseases of Women" (1872), p. 745.

The patient is then turned somewhat on the side whereon the cyst originates, and the latter is drawn through the incision by the right hand grasping the canula, while the left manipulates the other portions as may be required. If more than a slight degree of traction is required, all efforts should be discontinued till the cause of resistance is ascertained and removed. It is generally found to be a second hitherto unsuspected constituent cyst of the original tumor, or pelvic adhesions not before recognized. Possibly, however, the incision is still too short for the extraction even of a collapsed monocyst.

The extraction of the cyst is also rendered more difficult if the walls are very thin or very friable. Sometimes the latter give way almost as soon as touched, especially in case of polycysts with very viscid colloid contents. I have been obliged in two such cases to scoop out the broken cyst-walls with their contents from the peritoneal cavity with the whole hand.

The cyst is finally removed after a temporary or permanent clamp, or a ligature, or some other agent, is applied to the pedicle to prevent hæmorrhage; the latter being divided at its junction with the cyst by the scissors, or the knife, unless some one of the less common methods of treating the pedicle is resorted to.

SECTION IV.

TREATMENT OF THE PEDICLE.

The management of the pedicle is generally regarded as of the very highest importance. Numerous methods have therefore been resorted to, and which will be specified in the order in which they have been proposed and employed.

In the first operation of ovariotomy, in December, 1809, Dr. E. McDowell, of Kentucky, put a strong ligature around the pedicle and evacuated the cyst by an incision into it, and then removed the cyst (p. 237). The ends of the ligatures were brought out through the lower end of the incision. In his third operation, in 1816, he applied the ligature in the same way, and removed a solid tumor weighing six pounds.

The statement of Dutoit, that Chrysmar, of Isny, Würtemberg, in performing the first ovariotomy in Europe, in 1819, tied the pedicle in two portions, and cut the ends of the ligatures close, leaving the parts concerned *in situ*, is not confirmed. Dr. Hopfer, who reports the cases of Chrysmar in *Gräfe and Walther's Journal*, makes no such statement in regard to either of the three cases reported; but says that, in his successful case in 1820, he tied the pedicle in two portions, and brought the ends of the ligatures out through the lower part of the incision.

In 1821, Dr. Nathan Smith, of Connecticut, unaware that ovariotomy had ever been performed, tied the arteries in the pedicle, two in number, with leather ligatures, and also two arteries in the omentum, which he found adherent. All the ligatures were cut close, the parts returned, and the incision closed throughout.

Mr. J. Lizars, of Edinburgh, in 1825, in his second case, applied a single ligature round the whole pedicle, and then transfixed the latter with it. In the third, he used a single ligature and then tied all the vessels separately; and in the last case he tied the pedicle in two portions. In all his cases the ends of the ligatures were brought out through the incision.

Dr. D. L. Rogers, of New York, in 1829, tied the vessels separately in the pedicle—they being numerous, and one of them the size of a goose-quill—and cut all the ligatures close to the knots, and closed the incision.

K. Fr. Quittenbaum, of Rostock, in 1834, applied a single ligature around the pedicle.

In 1835, Dr. J. Bellinger, of South Carolina, tied two arteries in the pedicle in the same way as Dr. N. Smith, with animal ligatures, and cut them close.

Dohlhoff, of Magdeburg, in 1836, applied a ligature around the whole pedicle, and also tied the vessels separately.

In 1836, Mr. William Jeaffreson, of Framlingham, removed a cyst through an incision ten to twelve lines long; the ligature was cut short, the pedicle was returned, and the incision closed. Mr. Crisp treated a case in the same way in 1838.

Stilling, of Cassel, in 1837, applied a single silk ligature round the pedicle, and his patient died of hæmorrhage. He then recommended that a portion of the tumor be left upon the pedicle, and made to protrude through the incision; or, in case the pedicle was too short, to bring it to a level with the wound, and secure it with sutures—so that the bleeding vessels could in either case be seen. In the report of another case (successful) in 1848 in which he applied this method, he assigns the reasons in favor of it; and it was subsequently adopted by Langenbeck, of Berlin.[1]

Stilling has, however, since been sometimes quite superfluous in resources, employing two or three different methods of treating the pedicle in the same case. Thus, in a double ovariotomy, he cauterized the right pedicle, ligated each artery, and then applied two constrictors. The left pedicle was constricted in like manner; and, finally, a needle was passed so as to transfix both pedicles. The patient died of trismus and opisthotonos.[2]

Dr. Charles Clay, of Manchester, commenced in 1842, and in his first operation put a ligature round the pedicle, and also tied the vessels separately. In his second case, he tied the pedicle in two portions. He has always brought the ends of the ligatures through the incision. Mr. Walne treated his cases in both the ways just mentioned, though adopting the double ligature in his first case.

Dr. F. Bird, of London, ligated the pedicle in 1843, in two portions, and then put a ligature round the whole.

Dr. J. L. Atlee performed double ovariotomy in June, 1843, tying both pedicles in two portions, and bringing the ends of the ligatures out through the incision.

In 1844, Dr. F. Bird tied the pedicle, in three portions, and then passed a fourth ligature around the whole.

Siebold, of Darmstadt, in 1846, tied the pedicle and cut the ligatures short, and closed the incision, as did Dr. N. Smith, in 1821, and Dr. Rogers, in 1829. Mr. Burd, of London, tied the pedicle in three portions, then passed another ligature round the whole pedicle, and finally tied the vessels separately. In this year, also, Dr. Handyside, of Edinburgh, after tying the pedicle, passed the ligatures through the Douglas *cul-de-sac* into the vagina. The patient died. Dr. March suggested this in 1849 (p. 245). Dr. Peaslee, not aware of this, did the same in 1854, in a successful case. Dr. J. F. Miner, of Buffalo, also employed this method in 1866; and Dr. W. W. Greene, of Portland, Maine, several times since.

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[1] Kiwisch, *op. cit.*, note, p. 219.

[2] Grenser, p. 41.

In 1847, Langenbeck proposed to tie the pedicle with ligatures without including the peritonæum, and then to bring them through the abdominal wound; and in a single instance he passed the ends of all his ligatures, twenty in number, through the eye of a large needle, and then brought them out directly through the abdominal wall in the inguinal region, and entirely closed up the incision. This patient, however, died from hæmorrhage of the pedicle, to the amount of five to seven pounds. He subsequently adopted Stilling's method.[1]

In 1847, M. Vaullégeard,[2] of Condé-sur-Noireau, France, put two ligatures around the whole pedicle. Recovery.

In 1848, Stilling first treated the pedicle by the extra-peritoneal method, as has been seen on a preceding page; and Dr. P. J. Buckner, of Missouri, also tied the pedicle in four portions. The last patient died. Mr. Crouch, of Surrey, did the same in 1849. The patient recovered.

In October, 1848, Maisonneuve, of Paris, treated the pedicle by torsion, holding it in a strong forceps while he turned the tumor three or four times upon its axis—and then closed the incision. Patient died twenty-two hours after the operation, there being neither hæmorrhage nor peritonitis.[3] Kœberlé states that Heyfelder, of Erlangen, lost three patients from hæmorrhage because he contented himself with mere torsion of the arteries.[4] In Heyfelder's first reported case (in 1846) he tied the pedicle *en masse*, and the patient recovered.

In 1849, Ed. Martin, then of Jena, first secured the pedicle in the lips of the incision (Grenser).

Dr. Van Buren, of New York, in 1849, applied his ligatures to the pedicle so as "to spare the peritonæum;" and in 1851 he tied the vessels separately.

In 1850, Kiwisch, of Würtzburg, and Krauel, of Rostock, also applied only one ligature round the whole pedicle. Dr.

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[1] Grenser, pp. 18, 19.

[2] Kœberlé, De l'Ovariotomie, p. 30.

[3] "Thèse de Concours," quoted by Dr. H. Vegas, p. 169.

[4] "De l'Ovariotomie."

Peaslee, in a case of double ovariotomy, applied a double ligature to each of the two pedicles, and brought their ends out through the incision.

In 1850, Mr. E. W. Duffin, of London, first in England made use of the extra-peritoneal method of treating the pedicle; Stilling, as we have seen, having suggested it in 1837, and having employed it (as also had Langenbeck) in 1848. Mr. Duffin, unaware of this, remarks:[1]

> It suggested itself to me that decomposition of the pedicle within the peritoneal cavity, as well as the irritation created by the ligature remaining in the abdomen, might be obviated by keeping the tied portion completely out of this cavity. I determined, therefore, to do so, by stitching the cut extremity and the ligature in the wound so as to prevent their receding into the pelvis, and to retain them in that situation till the ligatures should come away, and the wound, if it previously closed, [should] reopen to let the slough escape. Had the neck of the cyst [pedicle] been longer, it was my intention to have kept the whole portion included in the ligature entirely *outside the abdominal parietes*, by passing a long needle through it, exterior to the surface. . . . The wound healed up entirely by the first intention, and afterward opened on the ninth day for the purpose of allowing the ligature and slough to escape on the fifteenth, then continuing to suppurate for a few days, till the reopened part finally closed on the twenty-second day. The only objection to this plan was the disagreeable dragging of which the patient complained for about a fortnight.

Jules Worms states that Langenbeck, of Berlin, first stitched the pedicle into the incision, and covered it there by bringing the integument over it in 1851.[2] This has since been done by Dr. H. R. Storer, of Boston. I make the following extract from the report of Langenbeck's case, by Busch:[3]

> Le pédicule fut traversé par deux anses de fil et retenu dans la plaie; on le coupa petit à petit; cinq vaisseaux durent être liés au fur et à mesure que la section était faite; cinque points de suture, qui n'intérressaient pas le péritoine réunirent les bords de la plaie abdominale. Deux d'entre elles traversaient le pédicule.

M. Worms also states that "dans un cas de brièveté extrême du pédicule, M. Langenbeck a fixé celui-ci contre la partie interne et inférieure de la paroi abdominale en la traversant avec une aiguille qui portait les fils dont était entouré le pédicule.[1]

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[1] "Medico-Chirurgical Transactions," vol. xxxiv., pp. 1–5, and, *Provincial Medical and Surgical Journal*, 1851, p. 23.

[2] *Gazette Hebdomadaire*, 1860, November, p. 744.

[3] "Compte rendu des Opérations pratiquées à la Clinique," par M. de Langenbeck (Canstatt's Jahresbericht, 1854, vol. iv., p. 220).

Ed. Martin, in 1851, ligated the pedicle in two portions; then passed another ligature around the whole; and finally sewed the pedicle into the incision, as recommended by Stilling. In 1852 he advised to fasten the cyst temporarily to the abdominal walls before opening it, so that nothing may escape from it into the peritoneal cavity; basing this suggestion upon the result of one successful operation. He objects to torsion of the pedicle and its replacement in the peritoneal cavity, as employed by Maisonneuve. He first ligated every vessel separately, and then drawing several of these threads through the pedicle, and avoiding the peritoneal covering, fixed it by means of them in the lower angle of the wound, through which they were passed and then fastened to the abdomen externally.[2]

In March, 1858, the *écraseur* was first applied to the pedicle by Dr. J. L. Atlee.[3] His brother Dr. W. L. Atlee had, in 1864, used it sixteen times; and Dr. Pope, of St. Louis, twice.[4] Mr. Wells used the *écraseur* in his thirty-eighth case merely to constrict the pedicle temporarily. But, finding there was no hæmorrhage after he separated the tumor, he returned the pedicle into the abdominal cavity. Recovery.[5]

The clamp was first applied to the pedicle by Mr. J. Hutchinson, of the Metropolitan Free Hospital, September 27, 1858.[6] He had previously (in three cases) employed the method of transfixing the pedicle, tying it, and securing it in the wound.[7] The form of Mr. Wells's clamp most used in this country at present is shown by Fig. 41.

Dr. Herrera Vegas states that the ligatures constricting the pedicle have been passed out from the abdominal cavity by the inguinal canal; but does not mention either the operator or the date.[8]

In January, 1860, Dr. Simpson proposed the acupressure needle for the treatment of the pedicle.[9] In June, 1861, Dr.

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[1] *Op. cit.*, December, p. 806, foot-note.

[2] Grenser, p. 4.

[3] *North American Medico-Chirurgical Review*, July, 1858.

[4] *American Journal of Medical Sciences*, April, 1859.

[5] *Op. cit.*, p. 112.

[6] *London Medical Times and Gazette*, November 6, 1858.

[7] Ibid., July 17, 1858, p. 75, and October 23, 1858, p. 434.

[8] *Op. cit.*, p. 107.

[9] *Edinburgh Medical Journal*, vol. v., p. 649.

W. Tyler Smith, of London, in performing his eighth ovariotomy, practised the method of Dr. Nathan Smith in 1821, Dr. Rogers in 1829, and Siebold in 1846; i. e., he cut the ligatures close to the knots, and closed the incision. He repeated this method in his twelfth operation, and so onward to his twentieth. It has since been associated, in England, with his name.

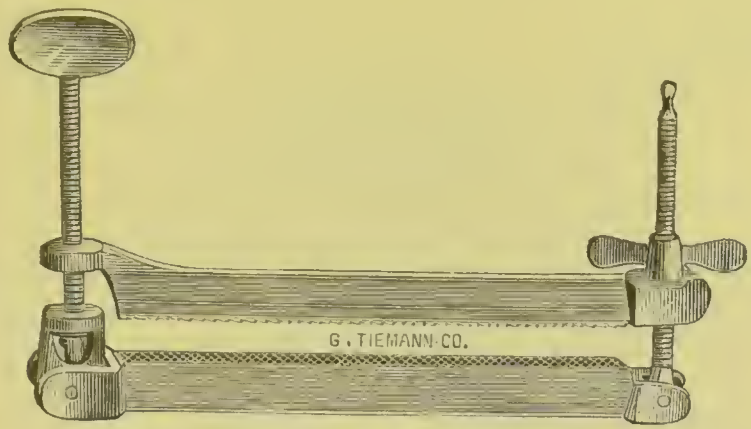

FIG. 41.—T. S. Wells's Clamp.

M. Kœberlé, since commencing as an ovariotomist in 1862, has differed from other operators in the following respects: Always endeavoring, if possible, to secure the pedicle outside, he first embraces it in a loop of strong wire, which he applies by means of an instrument of his own contrivance, a "serre-nœud," and in every respect similar to an *écraseur*, only of a smaller size, not more than five inches in length (Fig. 42).

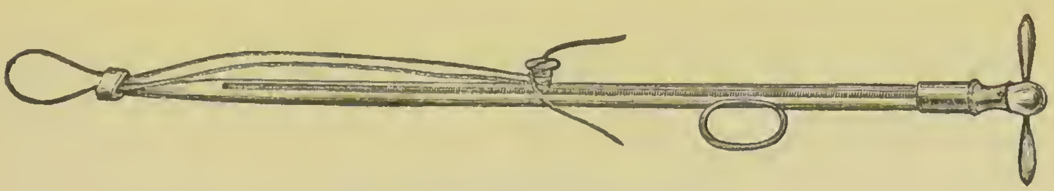

FIG. 42.—Kœberlé's Serre-nœud.

With this instrument the pedicle is constricted to a degree of tightness little short of laceration, after which a silk ligature is applied immediately below the point of constriction, and the wire immediately detached. The cyst is next cut away, and the stump held outside.

This part of the arrangement is effected by transfixing the free portion of the severed pedicle with a slender trocar and canula; the trocar being withdrawn, and the silver canula allowed to remain crosswise of the incision."[1] He, however, also employs a circular constrictor or clamp, which is shown by Fig. 43.

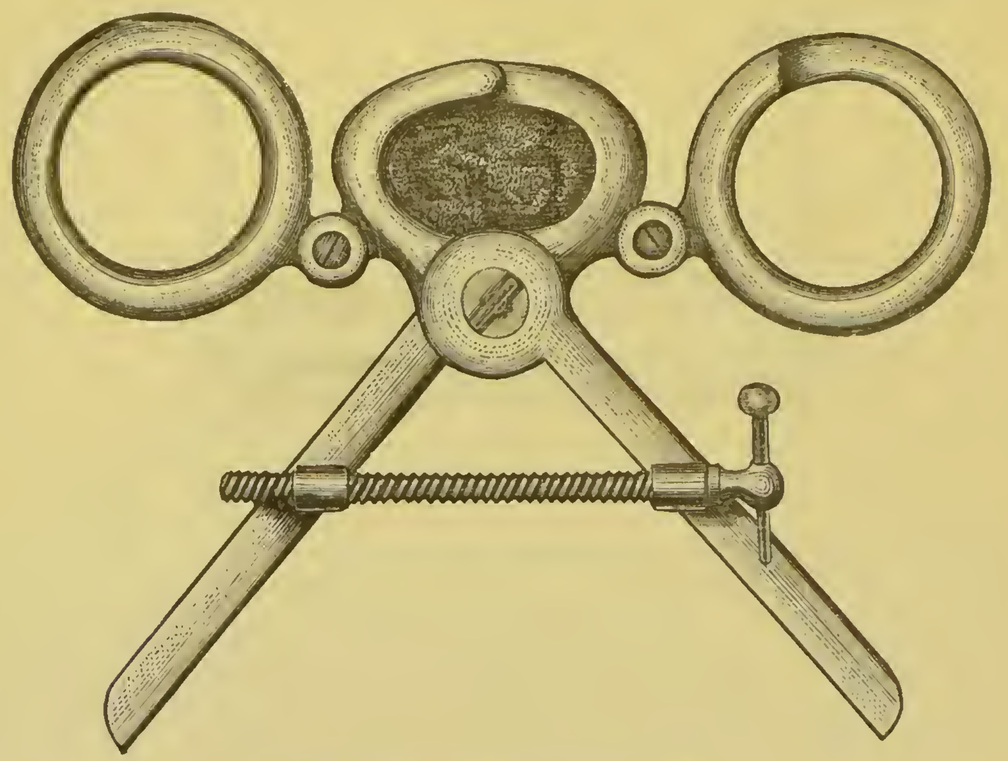

FIG. 43.—Kœberlé's Circular Clamp.

In October, 1863, Mr. Bryant applied seven thick whipcord ligatures to the pedicle of his seventh case, which proved unsuccessful.[2]

In November, 1864, Mr. Wells treated a pedicle,[3] two inches long, and as broad as the hand, by first applying a medium-sized clamp, then a small *écraseur* below the clamp, and a strong silken ligature below the latter. Recovery.

The actual cautery was first used in the treatment of the pedicle, December 28, 1864, by Mr. I. B. Brown, of London. He did not raise the temperature quite to white heat.[4]

In 1865, Dr. Murray, of the Great Northern Hospital, London, proposed to apply a ligature in the form of the figure 8, and devised a trocar which secured the contact of the cyst-wall with it. Dr. T. A. Emmet reported his use of the silver wire in the same way in 1870. In August of this year, also, Dr. J. H. Aveling, of the Sheffield Hospital, used a coil-clamp, as he termed it, in the treatment of the pedicle. A description of it is given in the "Obstetrical Transactions," vol. viii., pp. 229–231. It is recommended only in case of a short pedicle. It was removed in forty-eight hours. Patient recovered.

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[1] Correspondence of Dr. G. Kimball, *Boston Medical and Surgical Journal*, December 26, 1867.

[2] "Obstetrical Transactions," vol. vi., p. 47.

[3] Case 114, p. 316, *op. cit.*

[4] Ibid., vol. viii., 1867, pp. 30, 31. It was first proposed by Dr. J. Clay.

Masslovsky, of St. Petersburg, in 1868, first performed the flap-operation upon the pedicle, claiming that, in such circumstances, there is no adhesion of the pedicle to the surrounding parts.

Spiegelberg, of Breslau, first employed the galvano-caustic apparatus in the treatment of the pedicle.[1]

Dr. J. F. Miner, of Buffalo, in 1866, tied the separate vessels in the pedicle, seven or eight in number, after putting on a temporary double ligature.[2]

In 1868, Dr. H. R. Storer, of Boston, Massachusetts, recommended "pocketing the pedicle,"[3] as had been practised, in 1851, by Langenbeck. He had also operated by detaching the Fallopian tube from the cyst, and leaving it in the pelvis. In this year, also, Prof. Humphrey, of Cambridge, England, practised torsion of the pedicle after the method of Maisonneuve in 1848.[4]

In 1869, Dr. G. H. B. McLeod, of Glasgow, tried twisting off the pedicle by means of two pairs of stout forceps. He admits that short, thick pedicles may not be manageable in this way. He proposed a new instrument for this method of treatment in the *Lancet*, 1871, vol. i., p. 108.[5] "The pedicle is seized with a sort of clamp-forceps, with narrow, small, and female blades, which are thus capable of maintaining a very firm hold, their apposition being kept up by means of a screw. After cutting away the cyst at the extreme distal end of the pedicle, the stump is seized with another pair of stirrup-shaped, fenestrated forceps, also provided with quadrant and screw; this latter instrument being slowly turned, while the first-named forceps is maintained at rest, the stump of the pedicle is by this means twisted off close to the portion held by the first forceps."

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[1] Grenser, p. 44.

[2] *Buffalo Medical and Surgical Journal*, June, 1866, p. 423.

[3] *American Journal of Medical Sciences*, January, 1868, p. 77.

[4] *American Journal of Obstetrics*, February, 1869, p. 429.

[5] *American Journal of Medical Sciences*, April, 1871, p. 578; and June, 1871, p. 279.

In 1869, also, Dr. J. F. Miner first practised *enucleation* of the pedicle. He remarks, in regard to the first case in which he employed this method, that the cyst was universally adherent, "but the attachments were not so firm but that they could be broken up, and with great care the tumor was separated from the surrounding parts until the pedicle was reached. The process of enucleation had been carried on so extensively and successfully that encouragement was afforded for continued trial; the pedicle was large and extended over a wide surface, but by gentle and patient effort it was separated from its entire attachment to the tumor, and the immense growth removed without the ligation of a single vessel. The terminal branches of the vessels of the pedicle gave out no more blood than issued from the vessels of the attachment elsewhere, and there appeared no more occasion for ligature here than elsewhere. All

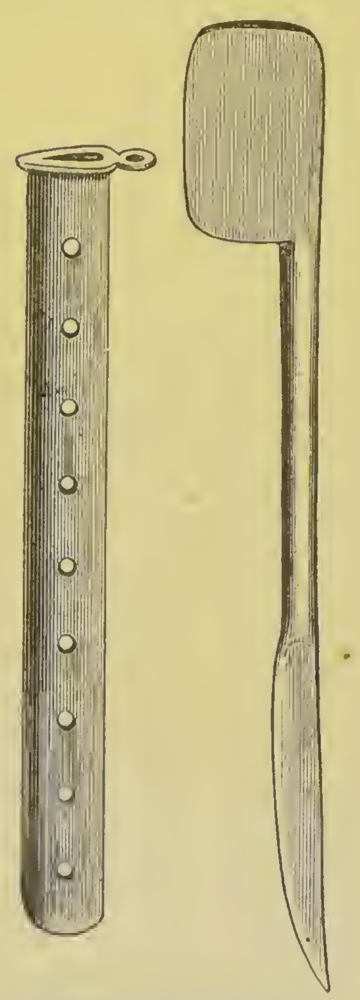

FIG. 44.—PEASLEE'S TUBE FOR TREATING THE PEDICLE.

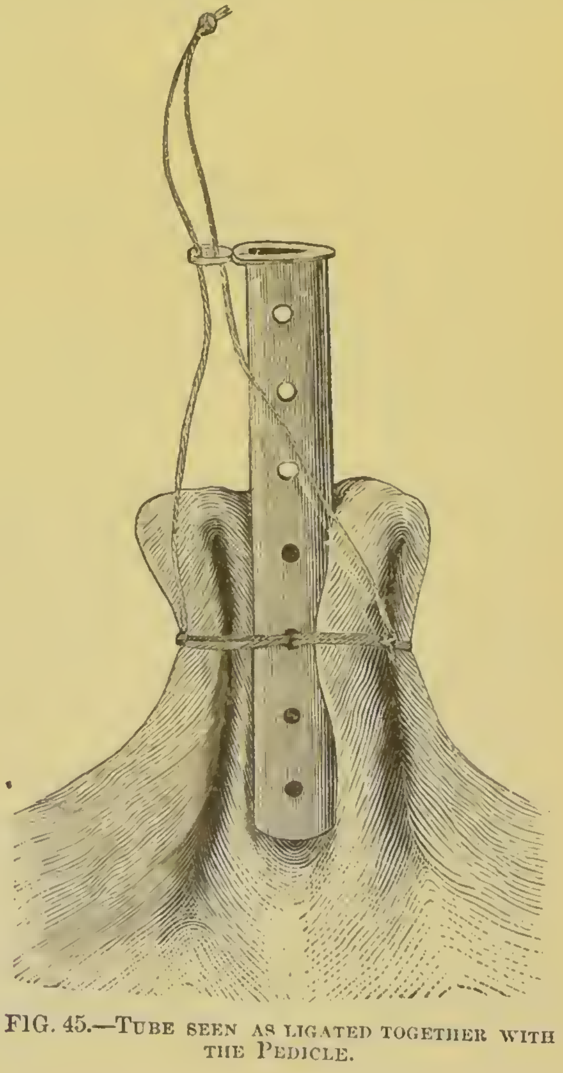

FIG. 45.—TUBE SEEN AS LIGATED TOGETHER WITH THE PEDICLE.

hæmorrhage soon ceased, and the incision was closed by interrupted suture."[1] He has since employed this method several times successfully, and it promises to be a very valuable one in a certain class of cases.

Dr. Peaslee, in 1869, suggested a method of treating the pedicle on a principle admitting of removal of the constriction, as well as the ligature, at any moment. It is proposed especially for pedicles not too wide to be included in two ligatures only. His instrument consists of a flattened silver tube (Fig. 44) three or four inches long, and one-half inch wide, perforated by holes one-sixteenth of an inch in diameter, and one-third of an inch apart. The double ligature transfixing the centre of the pedicle is also drawn through one of the holes in the tube, and then the latter is tied firmly to the pedicle while the two ligatures are made to enclose each one-half of the pedicle as usual. On closing the incision the tube is brought out through the abdominal wall, since it is left projecting two inches or more beyond the cut end of the pedicle; and the ligatures are passed out by the side of the tube, one end of each ligature having been cut close to the knot (Fig. 45). When the time has arrived for removing the ligatures (forty-eight to ninety-six hours), a knife-blade of peculiar form, and accurately fitting the tube within, is passed down into the tube; both ligatures are divided, and are then, together with the instrument, removed (Fig. 46).

The appearance of the instrument *in situ*, after closure of the incision, is shown by Fig. 50.

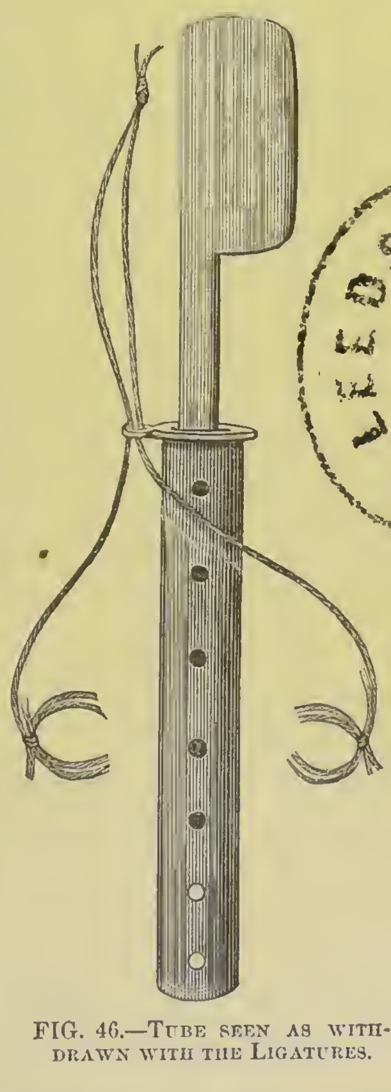

FIG. 46.—TUBE SEEN AS WITHDRAWN WITH THE LIGATURES.

In the same year Dr. E. Johnson, of the Sheffield Hospital for Women, applied silk ligatures to the pedicle, which were "secured with iron-wire coils, the heads of which protruded through the lower part of the wound."[2]

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[1] *Buffalo Medical and Surgical Journal*, June, 1869, p. 420.

[2] *The Lancet*, January, 1869, pp. 44–46.

Dr. P. J. Hayes, of the Mater Misericordiæ Hospital, Dublin, in 1871,[1] proposed the "subperitoneal" method of securing the vessels of the pedicle, which he thinks will prove especially useful where the pedicle is short. "It consists in firstly compressing the pedicle between the blades of a clamp or long forceps, then passing a needle armed with a stout catgut ligature beneath a good thickness of the serous surface of the pedicle, but superficial to the principal vessels; the needle being withdrawn at the side opposite to the point of entrance, is again passed into the aperture of exit, and pushed between the vessels and peritoneal covering on the side of the vessels opposite its first passage, until it can be withdrawn through the opening made by its first entrance; then the ends of the catgut ligature are to be strongly tied and cut off short, so as to prevent the possibility of hæmorrhage from the included vessels; yet, owing to the bulk of unligatured substance superficial to the catgut, there will be no sloughing of the end of the pedicle, its vitality can be maintained, and even adhesions will probably connect it with some adjacent portion of the peritoneal surface, while, in time, the catgut enclosed by living tissue may become absorbed. Although bleeding from the chief vessels can be prevented in the manner described, yet it is quite possible that oozing may take place from the divided orifices of small circumferential vessels. In such a case the actual cautery applied to the cut surface will afford ample security against recurrence of bleeding."[2]

In 1871, Dr. W. W. Greene, of Portland, made use of the spring ligature for constricting the pedicle. The spring causes rapid ulceration of the stump, and consequently more rapid withdrawal of the ligatures, which are removed only after the stump is cut off by them. It is described in the *Boston Medical and Surgical Journal* for March 2, 1871, p. 141. Dr. Green has discontinued the passing the ligatures from the Douglas *cul-de-sac* into the vagina, as explained on page 438, from the suspicion that phlebitis of the lower extremity on the same side, occurring in several instances after the use of this method, may have been produced by them.[3] But this has also occurred in cases not thus treated. Dr. S. H. Tewksbury, of Portland, regards this as the best method.

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[1] *Dublin Quarterly Journal of Medical Science*, November, 1871.

[2] Rankin's *Abstract of the Medical Sciences*, January, 1872, p. 276.

[3] *Boston Medical and Surgical Journal*, March 2, 1871.

Classification of the Methods of treating the Pedicle.

All the preceding methods of treating the pedicle may be included under two categories: those which leave the stump of the pedicle in its natural relations; and those which bring it externally to the peritoneal cavity, so as to leave it permanently adherent to the abdominal wall at its line of correspondence with the abdominal incision. The latter is termed the *extra-peritoneal*, and the former the *intra-peritoneal* method. The following arrangement gives this distinction, without stating the non-essential peculiarities of each method:

I. *Intra-peritoneal Methods.*

Method of Dr. McDowell—One ligature round the pedicle, one end or both coming through the abdominal incision.
Dr. Chrysmar—Two ligatures; one end of each coming through the incision.
Dr. Nathan Smith—Arteries separately ligated, and ligatures cut close to the knots, and pedicle returned.
Heyfelder—Torsion of the separate vessels.
Maisonneuve—Torsion of the whole pedicle.
Siebold—A ligature round each half of the pedicle, cut close to the knot.
Dr. Simpson—The acupressure needle.
Dr. J. L. Atlee—The *écraseur*.
Dr. Murray—The figure-of-8 ligature.
I. B. Brown—The actual cautery.
Dr. Aveling—The coil-clamp.
Masslovsky—The flap-operation.
Spiegelberg—The galvanic cautery.
Dr. McLeod—Twisting off the pedicle.
Dr. Peaslee—Ligatures and flattened tube (p. 445).
Dr. Miner—Enucleation.
Dr. Hayes—Sub-peritoneal constriction.
Dr. Greene—Spring ligature.
Dr. Johnson—Iron-wire coils.

II. *Extra-peritoneal Methods.*

Method of Stilling—Pedicle stitched into the wound; or transverse pins used instead of sutures.
Langenbeck—Pedicle stitched into the wound, and covered by the skin of the abdomen.
Hutchinson—The clamp.
Kœberlé—The *serre-nœud*, or the circular clamp.

In estimating the comparative merits of the preceding ways of management of the pedicle, they may be reduced to a very few representative methods:

1. In the first place, the clamp alone may represent the extra-peritoneal method. That of stitching the pedicle into the incision, and also covering it with the integument of the abdomen (Stilling's and Langenbeck's method), give a better finish to the operation than the clamp does, for the time being; but their application is less simple and rapid, they are not so certain a safeguard against hæmorrhage, and no better against peritonitis. For, though the incision is not completely closed externally in case the clamp is applied, its proper application secures a closure of the peritoneal cavity as really as do the other two methods. On the other hand, the ultimate result is the same in each of the three methods—a permanent connection between the pedicle and the abdominal walls in the portion of the incision with which it was brought in contact. The use of pins, placed transversely through the pedicle and the incisions, may be regarded as obsolete; and M. Kœberlé's *serre-nœud* and circular clamp have no advantage over the clamp more generally used.

2. The intra-peritoneal methods may also be very much simplified for comparison; the prime division being into—1. Those which include the application of ligatures to the pedicle; and—2. Those which entirely dispense with them.

I. *Intra-peritoneal Methods requiring Ligatures.*

1. Ligatures to the pedicle.
    - *a.* Coming through incision.
    - *b.* Cut close to knot.
    - *c.* Peaslee's method.
2. Ligatures to the separate vessels of the pedicle.
3. Sub-peritoneal constriction.
4. The flap-operation.

II. *Intra-peritoneal Methods dispensing with Ligatures.*

1. Torsion of the separate vessels.
2. Torsion of the whole pedicle.
3. The acupressure needle.
4. The *écraseur.*
5. The actual cautery.
6. The galvanic cautery.
7. Enucleation.

So long as surgeons hesitated to include the peritonæum in the ligatures, from the fear of thus exciting inflammation of that membrane, the vessels of the pedicle were by some operators separately tied; but since experience has shown that there is no special ground for that apprehension, their example has been but very rarely followed. Hereafter, ligatures will be mostly applied, if at all, directly around the pedicle, in two or more portions as its dimensions may require. This method, therefore, with its three modifications above mentioned, may alone represent the first form of the intra-peritoneal method. From a preceding remark, it will be seen that I do not regard subperitoneal constriction as an improvement; and I include the flap-operation in the same category.

The forms, however, which entirely dispense with the ligature, cannot be so easily disposed of, being seven in number, and all commending themselves, by the fact that no foreign substance is left in the peritoneal cavity, nor in contact with the wound, after the operation is completed. I, however, here dismiss acupressure, as the most difficult and the least reliable of these methods.

Torsion of the separate vessels of the pedicle has recently been quite successfully applied by Dr. Beebe, of Chicago.[1] Of five cases thus treated, four recovered. He met with more difficulty in managing the veins than the arteries. Like torsion of the whole pedicle, it is a method applicable only when the latter is long and its vessels are small. The vessels should be twisted to the extent of three-quarters of an inch to an inch. Torsion of the whole pedicle has recently succeeded in Mr. Jessup's hands;[2] but both these methods, as well as the use of the *écraseur*, leave in the mind of the operator an apprehension of hæmorrhage for the next forty-eight hours, which the most cautious will avoid by resorting to some other method. I agree with Mr. I. B. Brown, that the *écraseur* requires too much time for its application in ovariotomy, while it also risks a rupture of the parts continuous with the pedicle, and especially of enlarged veins often found surrounding it, by the unequal traction on its different portions.

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[1] *American Journal of Medical Sciences*, April, 1871, p. 353.

[2] *The Lancet*, December, 1871, p. 654.

The galvanic cautery has not, thus far, fulfilled the expectations of the few who have employed it. Spiegelberg lost a case from gangrene of the stump of the pedicle after its use.[1]

In favor of the actual cautery, however, much more may be said. Mr. I. B. Brown had, in 1868, used it in forty-six cases, of which forty-one recovered.[2] This statement, however, gives too strong an impression in favor of this method, since in quite a number of instances the cautery failed to arrest the hæmorrhage from the pedicle, as has been stated (p. 266), and one or more ligatures were applied before it was returned into the abdomen. Such cases should of course be reported as treated by the ligature, and not by the cautery. It was remarked to me, when present at two of Mr. Brown's operations, that the cautery generally fails to arrest the hæmorrhage unless the pedicle is thick and fleshy; for the reason, I suppose, that the clamp so compresses a thin pedicle and collapses its vessels, that the heat of the cautery is not communicated to it sufficiently to act upon the latter. The statement, therefore, of Mr. Brown, that the cautery is applicable in every case, must not be understood to mean that it can in every case be relied upon to control hæmorrhage. At the discussion upon this subject[3] in the London Obstetrical Society, Dr. Parsons objected to the use of the actual cautery, that hæmorrhage would be likely to ensue if vomiting should occur. Dr. Routh has, however, since had a case in which the cautery was tested by severe vomiting, but hæmorrhage did not ensue.[4] He advocates its use when the arteries of the pedicle are not larger than the radial or ulnar; while, if of the size of the femoral, ligatures should be applied.[5]

Mr. Wells found the actual cautery so unreliable that he has long since entirely discontinued its use. Prof. White, of Buffalo, is, I think, the only one in this country who generally uses it, and it is scarcely employed at all on the Continent. I do not think this method should be entirely discarded. It may be used as defined by Dr. Routh, but always with the expectation that the ligature may be also required. Then, if it be found that the cautery alone actually controls the bleeding, the incision may be entirely closed, and no foreign body be left in the peritoneal cavity. The iron should be used at a temperature somewhat below white heat, and be applied for some time to the end of the stump, so that the heat may penetrate to some distance into the substance of the pedicle. Mr. Brown asserts that many others have failed in its use, from not taking this last precaution.[1]

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[1] "Archiv für Gynackologie," B. I., 1870.

[2] *Op. cit.*, p. 27.

[3] "Obstetrical Transactions," vol. viii., pp. 30, 31.

[4] Ibid., vol. viii., p. 131.

[5] *The Lancet*, 1866, vol. ii., p. 578.

Enucleation is a method of treating the pedicle which has hitherto been resorted to only in this country. It cannot be regarded as of universal application, but may succeed in many cases of oligocysts and monocysts with only small vessels in the pedicle. It will, however, be found most valuable of all in cases of cysts so adherent to the viscera or the walls of the pelvis as to forbid extraction in any other way, and will therefore, if properly understood, hereafter diminish the number of uncompleted ovariotomies. I have already spoken of its advantages in these circumstances in connection with the detachment of pelvic adhesions (p. 430). It must, however, be understood that enucleation, under such circumstances, will very seldom dispense with the use of ligatures. Its excellence consists in its capability of removing the cyst when no other method can succeed, and not in any superiority in cases in which the other intra-peritoneal methods usually succeed.

The Comparative Merits of the Preceding Methods of treating the Pedicle.

After what has just preceded, I need merely to consider the question between the clamp as the representative of the extra-peritoneal methods on the one hand, and the ligature on the other. For, though several of the intra-peritoneal methods are adapted to the circumstances I have specified in my remarks respecting them, until some satisfactory method of carrying into effect the principle I have proposed on page 445 has been devised, the general question as well as the general practice must be between the two methods just mentioned. It will also be understood that I speak of the ligature in this comparison with the clamp, only as used by ovariotomists at the present time—the end being either brought through the incision, or cut close to the knot.

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[1] See Mr. P. Harper's remarks on "The Actual Cautery," in the *Lancet*, 1867, p. 118.

I shall consider—

1. The objects which should be aimed at by every method of treatment of the pedicle.
2. The alleged advantages of each of the two methods to be compared.
3. The alleged objections to each.
4. A comparison of their actual merits;
5. As confirmed by the statistics of each.

1. The **essential objects to be secured** by all methods of treating the pedicle are but two in number:

a. Security against hæmorrhage from the divided vessels of the pedicle.

b. The avoidance of agencies producing or predisposing to peritonitis or septicæmia, since these two conditions are the most common causes, as has been seen, of a fatal result.

With some it is deemed important to close the incision throughout at the time of the operation. But this is a matter of preference merely, rather than of very great practical importance, since the peritoneal cavity itself is closed, and the admission of air prevented, by the careful use of all the methods I have mentioned. And, as a rule, nothing occurring in the incision outside of the peritoneal cavity determines a fatal result. The method, therefore, which best fulfils the two intentions just mentioned is the best, and should take the precedence. But the form and dimensions of the pedicle vary so much in different cases that, as might be expected, no one exclusive method is yet known which is found to be the best for all possible conditions.

2. **The alleged advantages of the clamp** are:

a. Its facility of application, it being in fact the simplest method of treatment, and therefore best adapted to the inexperienced.

b. Its reliability in preventing hæmorrhage, and the facility it affords for arresting it, should it occur. In the last respect its superiority is incontestable; in the preceding it must be compared with the ligature, since we have seen that it failed to arrest hæmorrhage three times even in one of Stilling's cases.

c. It does not predispose to peritonitis nor septicæmia, since it leaves no foreign body in the peritoneal cavity. Except so far as dragging upon the parts continuous with the pedicle may predispose to peritonitis, this is true.

d. It is a comfort to have the pedicle in sight, especially if it be of the vascular kind (Grenser). Not a controlling reason.

The alleged advantages of the ligature are :

a. It can be applied in *all* cases. But this fact cannot be adduced as a reason for applying it in all cases as an exclusive method, since it does not prove that it is best in all or in a majority of cases. Other considerations must settle this question.

b. It is the most reliable method of preventing hæmorrhage from the pedicle. But it has failed as well as the clamp ; especially when it did not transfix the pedicle,.as in Mr. Wells's one hundred and second case.[1]

c. It admits of a complete closure of the incision, if its ends are cut close, and very nearly so if they are brought through the incision. But this is rather a matter of taste and convenience than of much practical importance.

d. It does not drag upon the pedicle ; a very important point. But it has been so applied as to drag on the pedicle, as in the eightieth case of Mr. Wells.[2] The pedicle was, however, of the shortest possible kind. The patient recovered.

3. **The alleged objections to the clamp** are :

a. It prevents the entire closure of the incision. Practically not important.

b. It requires care and attention for several days after the operation. Also unimportant. So does the ligature, unless cut close to the knot, and for a still longer time.

c. It produces traction of the pedicle, if not sufficiently long, and serious symptoms therefrom—as headache, severe pain referred to the hip, sciatica,[3] vomiting, and even fatal collapse. Kiwisch, therefore, and all subsequent writers, have called attention to dragging of the pedicle as something always to be avoided. Dr. Lyon's case, reported in the *Lancet*, November,

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[1] *Op. cit.*, pp. 267, 268. [2] *Op. cit.*, p. 199. [3] Ibid., pp. 130, 133, 195.

1863, died in consequence of it in sixty-eight hours; and four other instances of its fatal effects are reported in the same journal for April, 1861, p. 323. It should also be added that dragging may occur from the application of the clamp even in case of a long pedicle, if the abdominal walls be very thick, or should tympanites or violent coughing or retching occur after the operation. The symptoms were so violent in one of Mr. Wells's cases that he removed the clamp in four hours after the operation, though the patient recovered.

From the preceding it must be inferred that the clamp should be applied only in case of a long pedicle; i. e., long enough to project freely through the incision of the abdominal walls without any tension.

d. It necessitates a permanent union of the pedicle with the abdominal walls, in its original line of exit through the abdominal incision. This has been deemed a very important objection, since it has often led to menstruation at the site of the incision, the Fallopian tube still remaining open; and may predispose to internal strangulation of a portion of intestine, and to miscarriage if pregnancy should occur.

But the abdominal menstruation, a mere inconvenience for the time, ceases after a few months; and pregnancy is found not to be interfered with by the adhesion of the pedicle to the abdominal wall. Strangulation of intestine has, however, occurred in three or four instances of all the cases in which the clamp has been applied, and generally some weeks after the operation. Mr. Wells's seventeenth case terminated fatally, from intestinal obstruction, in forty-six hours after the operation;[1] but here the ligature was used, and the strangulation did not depend on the treatment of the pedicle. This should, therefore, not be a prevalent objection to the clamp. It is an unsurgical method to contemplate; but fancy must give way, when vital results hang upon the measure adopted.

e. Two clamps cannot be easily applied in case of double ovariotomy. Still Mr. I. B. Brown, in one instance, applied four clamps.[2]

f. The clamp has failed to arrest the hæmorrhage in the most experienced hands. It slipped from a portion of the pedicle, in consequence of retching and vomiting, in two of Mr. Wells's earlier cases—Nos. 90 and 103.[1] The bleeding was arrested by a ligature in the former case, and the clamp was tightened again in the latter. Both patients died.

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[1] *Op. cit.*, pp. 62–67.

[2] *The Lancet*, June, 1863, p. 409.

g. The clamp gives rise to very serious accidents. In one of Dr. Keith's cases, "in a fit of coughing the clamp broke away from its moorings, and slipped entirely into the cavity of the abdomen. It could not be reached by the fingers, and remained undisturbed for ten days, when being detached from the pedicle, it was finally extracted, the patient meanwhile experiencing no serious interruption to her convalescence and recovery." [2]

Another accident produced by the clamp is a hernia of the pedicle. Of Mr. Wells's first one hundred cases, this accident occurred three times (Cases 47, 53, and 84).[3] These three patients recovered. It also occurred in his two hundred and twelfth case. Recovery.[4]

The alleged objections to the ligature are:

a. That it is a foreign body in the peritoneal cavity, and, by producing an exudation, predisposes to peritonitis. But an exudation does not necessitate peritonitis, as some writers have assumed; and the latter has been inferred *a priori*, but not proved. The proportion of deaths from peritonitis after the use of the ligature is not, in fact, in the same class of cases, greater than after the application of other methods, the clamp included. The tolerance of contact of foreign bodies by the diseased peritonæum has already been illustrated. Mr. Wells, on the other hand, did not "remember any successful case in which peritonitis occurred, when the pedicle had been kept out." [5] Many might possibly say the same of the ligature, since, whether the latter or the clamp be used, peritonitis generally makes a case unsuccessful. The assertion, therefore, that the ligature *per se* produces peritonitis, is not sustained.

b. It has been asserted that the ligature causes the pedicle to slough off in the peritoneal cavity, where it is absorbed as

[1] *Op. cit.*, pp. 230, 272.

[2] Dr. G. Kimball's correspondence, *Boston Medical and Surgical Journal*, December 26, 1867, p. 454.

[3] Ibid., pp. 130, 140, 217. [4] Ibid., p. 307. [5] *The Lancet*, June, 1863, p. 409.

putrid matter, and produces septicæmia. The following quotation from my monograph on ovariotomy, published in June, 1864, will give my reasons at that time for rejecting this idea as erroneous:

"The assertion that the ligature produces a slough of the pedicle, which is separated and absorbed as putrid matter, needs confirmation. Dr. A. T. Barnes, of London, says that no such sloughing takes place;[1] while Mr. Wells had a patient die in thirty hours after the operation, from absorption, as he believes, of putrid matter from the sloughing stump. Dr. Miller, of Louisville, Kentucky, says 'there is no reason to believe that there is any difference' in the suppuration and sloughing, whether the pedicle is kept outside or left in the peritoneal cavity. I. B. Brown seems to admit the sloughing internally; but, as he returns the pedicle into the peritoneal cavity on the second or third day, after slipping off the clamp—when the stump must, of course, be just as dead as if the ligature had been in its place the same length of time (and more so, if there be any difference, from its exposure to the air)—he does not appear to fear any serious result from its sloughing and absorption. Indeed, he says there is as much danger from the air entering the peritoneal cavity as from the sloughing pedicle."[2]

Now, I am unable to find the facts which sustain the idea either that any such sloughing of the pedicle, or therefore any such absorption of putrid matter, actually takes place from the use of the ligature—unless in very rare and exceptional cases. On the other hand, the considerations soon to be specified point to the opposite conclusion. In opposition, however, to Dr. Miller's idea, I think there "is a reason to suppose" that the suppuration and sloughing of the stump would not be precisely the same, if enclosed in a cavity of a uniform temperature, and excluding the air, as if it were kept exposed externally. But the following facts seem to me to decide the question:

1. I have examined the reports of many fatal cases with special reference to this point; but in only a single instance is it stated that the stump was in a sloughy condition. In this

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[1] *The Lancet*, 1861, p. 483.

[2] Ibid., April, 1859, p. 322.

case, however, the pedicle was kept outside, and was found "sloughing" seventy-six hours after the operation.

2. In a case in which I removed most of the body of the uterus, the patient died six days after, of strangulation of intestine through the incision, produced by violent cough. Here the *post mortem* showed the stump included in the double ligature not to be sloughy; but, on the contrary, to be alive and nearly healed over by the exudation (just sufficient to afford the required amount of material) which had been poured out. Nor was there any trace of inflammation in the vicinity of the stump.

3. An experimental fact, quoted by Dr. Routh to show the great danger of septicæmia from sloughing of the pedicle if the ligature is applied,[1] proves that no such sloughing occurs. I refer for the facts to page 265. Were there sloughing, the fever (from septicæmia) should be the rule and not the exception. Three of my own patients had septicæmia; but all from a source unconnected with the pedicle; though the ligatures were retained eighteen weeks in another case in which septicæmia did not occur.

I am therefore compelled to conclude that the second objection also to the ligature—that it produces a putrid slough of the pedicle, to be absorbed, and thus also septicæmia—is not sustained.

"What, then, actually becomes of the constricted portion of the pedicle? As the portion of the femoral artery below the ligature, in case of a flap-amputation of the thigh that heals by first intention, is surrounded by exuded plasma, and kept alive in spite of the constriction, so that, when the ligature even cuts it off entirely by exciting ulceration, it does not slough, but becomes blended with the surrounding tissues and the organized exudation, so here, I suppose, the constricted portion of the pedicle is enclosed in the exudation and kept alive. In some cases, however, the pedicle seems merely to become atrophied and the ligature slips over the end. The former explanation is the more probable one in cases in which the ligature is retained a very long time. But if neither of these explanations be accepted, there is no fact to prove that the stump does not at any rate usually retain its vitality."[2]

[1] *The Lancet*, September, 1861, p. 183.

[2] "Monograph," p. 82.

In 1865 I had demonstrated the correctness of the opinion just quoted, by *post-mortem* examinations of three fatal cases; and my statements were published by me in May, 1867, as quoted on p. 265. They had also been reported to the London Obstetrical Society at its meeting on November 1, 1865, by Dr. Marion Sims.[1]

Since 1868 I have had repeated opportunities to confirm the statements made in 1867; and can affirm that in no instance have I found a pedicle, treated with a ligature, in a sloughing condition, nor have I ever lost a patient from any cause attributable by any possibility to the ligature, nor to any agency affecting the pedicle.

In 1868, Spiegelberg and Waldeyer experimented on dogs to ascertain the condition of the stump after ligature of the pedicle, and found, as I had already demonstrated in woman, that the former does not slough, but becomes attached to any surface which it touches.[2] Dr. T. Masslovsky, of St. Petersburg, had also previously made similar experiments on dogs, with the same result.[3] In two fatal cases after ovariotomy, Spiegelberg also found the pedicle had not sloughed; and in a case of death occurring at the London Hospital for Women, three months and eight days after ovariotomy, the ligature, cut short at the time of the operation, could not be found—it being quite embedded in the pedicle.[4] In some cases which have been carefully observed new cells and fibres have been found penetrating among the fibres of the ligature, and becoming blended with them.

The second count against the ligature, therefore, that it produces sloughing of the pedicle and consequent septicæmia, is not sustained. Sloughing has occurred as a very uncommon exception, and in a much debilitated patient, from the application of the ligature. It occurred in Mr. Wells's sixtieth case, though the patient died of exhaustion fifty-nine hours after the operation. But the traction of the clamp has far more frequently produced sloughing of the pedicle, of which several instances in the practice of Spiegelberg, Veit, Simon, and I. B. Brown, will be given in the concluding section of this work.

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[1] "Obstetrical Transactions," vol. vii., p. 232.

[2] Rankin's "Abstract," July, 1869, pp. 200–204; and *London Medical Times and Gazette*, November 28, 1868.

[3] *Edinburgh Medical Journal*, December, 1867, p. 538.

[4] *The Lancet*, March 9, 1872.

c. Finally, it has been objected that, as menstruation goes on through the abdominal walls after the use of the clamp, so, in case the ligature is used, it continues into the peritoneal cavity, and may thus produce hæmatocele, which may prove fatal. The ligature was solely used for about fifty years before the clamp was thought of, and in hundreds of cases since. If there be any real force in the objection just stated, it would seem to be high time that the first fatal case of the kind had been met with.

4. If, now, we institute a direct **comparison of the clamp and the ligature**, it must be by all admitted, in respect to the prime object of every treatment of the pedicle, that there is no securer safeguard against hæmorrhage than the ligature with any pedicle, but, above all, with a long one. It is therefore precisely what is always resorted to, if other means (the clamp included) fail to arrest the bleeding. It is only in case of a short pedicle that the ligature slips off, and even then but very seldom, if applied by an experienced hand. But the clamp may also slip, even from a long one. In respect to the direct causation of peritonitis and septicæmia, the clamp has a theoretical reputation for superiority which does not, however, as I have shown, stand the test of a scientific investigation.

But in this comparison the question is really whether the clamp or the ligature is preferable in cases of long pedicle alone; since the former entirely gives place to the ligature in cases of short pedicle. Recollecting that the cases of long pedicle, to which alone the clamp is applicable, are always the most favorable cases as a class, however treated, we should find the ligature also here to succeed, unless it is in itself an objectionable method. I find no instance in which an operator treated all his cases of long pedicle, specifying their number, by the ligature; and another who treated an equal number of the same class of cases with the clamp; so that the results may be directly compared. But the following view of the question will enable us to very nearly appreciate their relative merits:

If two operators, supposed to be equally skilful, have performed the same number (and a large number) of ovariotomies, each set of cases being supposed to be equal as to the length of pedicle and other conditions, and if one treats all his cases by the ligature, and the other all his cases of long pedicle by the clamp, and the rest by the ligature; it follows that he who has the highest amount of success shows his own method to be superior; the difference, of course, depending on the management of the long pedicles in both cases, since the short pedicles are treated in the same way in both.

In application of the preceding proposition, I add that Dr. Charles Clay treated all of his first two hundred and fifty cases with the ligature, and had one hundred and eighty-two recoveries; Mr. Wells treated his first two hundred and fifty cases generally, i. e., if the pedicles were long, with the clamp, and the remainder of the cases mostly with the ligature, and had one hundred and eighty recoveries. The ligature, therefore, does not suffer in comparison with the clamp, as applied entirely to long pedicles. If it be remarked that Mr. Wells did not, as I have supposed, always apply the ligature in the cases of short pedicle, it may be replied that it is quite as possible as is the opposite conjecture that the success with that class also would have been better if he had done so.

Much stress has been laid (not by himself) on the statement by Mr. Wells that, of five cases treated by him with the ligature, three died, and "two recovered probably more quickly than if treated by any other method," though he thought there was more evidence of sthenic peritonitis than often seen when the clamp is used. One of the three fatal cases, he believed, would have died under any treatment. The other two died of diffuse peritonitis, and might, Mr. Wells thought, have done better if the clamp had been used.[1] Is the value of the ligature to be decided by the results of five cases only of any operator? If so, I may also adduce my own first six cases, all treated by the ligature, and all successful. Suppose the clamp to be tried by the same kind of test. Of the last fourteen cases of Mr. Wells's third one hundred, ten died, and, of these ten cases, seven were treated by the clamp. But we have already seen (p. 399) that this result was ascribed by Mr. Wells to an unfavorable state of the atmosphere at the time.

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[1] "Obstetrical Transactions," vol. vi., p. 72.

5. The statistics for deciding the comparative merits of the ligature and the clamp are not so extensive as might be desired, since the clamp has been of late so generally used by the most experienced operators. The ligature has, however, been tested in nearly four hundred and fifty collected cases, and with results not equalled by the use of the clamp in the same number of cases in the hands of as many different operators.

Kœberlé made the general statement, in 1864,[1] that he had found that, of cases without adhesions, or with adhesions not requiring ligatures, the extra-peritoneal method of treating the pedicle saved four-fifths (eighty per cent.), while the intra-peritoneal saved three-fourths (seventy-five per cent.). But this must not be taken as a correct expression of the relative merits of the clamp and the ligature in cases as they occur in practice and at the present time. For his first class includes only cases of long pedicle. Mr. Wells, who has used the clamp when possible, saved sixty-six per cent. (p. 368) of his first, seventy-two of his second, seventy-seven of his third, and seventy-eight per cent. of his fourth hundred cases. Dr. W. L. Atlee has saved about seventy per cent. of his cases by the use of the clamp, when practicable. Dr. Keith saved eighty-one per cent. of his first one hundred cases; but it was not the clamp which secured his remarkable success, since he made no peculiar use of that instrument. The actual results from the use of the ligature are shown by the following table:

OPERATORS.	Cases.	Recovered.	Died.	Per cent. saved.
Dr. Charles Clay.......	250	182	68	72.80
" A. Dunlap.........	60	48	12	80.00
" Bradford..........	30	27	3	90.00
" Peaslee............	28	19	9	67.86
" Tyler Smith........	19	15	4	78.94
" Emmet	17	8	9	47.06
" Sims	12	10	2	83.33
" Axford............	7	5	2	71.43
" Tewksbury	7	3	4	42.86
" Crosby	5	2	3	40.00
" Bennett...........	4	3	1	75.00
" Hill	6	3	3	50.00
Total..........	445	325	120	75.34

When it is considered that this statement includes the practice of twelve different operators, one-half of them having had but a slight experience, it certainly speaks well for the ligature. It also includes all the cases of each operator mentioned; and in no instance were the cases selected. On the contrary, with most of the operations in this country, the cases were generally below the average of promise. I have had but two cases which came up to that point, most of the rest belonging to Kœberlé's third category (p. 393). I know the same to be true also of Dr. Emmet's cases.

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[1] "De l'Ovariotomie," p. 86.

Again, if we test the comparative merits of the ligature and the clamp, in the experience of the same surgeon, we find the latter has no advantage over the ligature. Mr. Bryant operated nineteen times (once only with the ligature), and lost nine patients. He then operated seven times with the ligature, and all recovered.[1] Such is the experience with the ligature in this country, and in Great Britain. In Germany, of thirty-eight cases collated by Wagner, which were treated by the ligature, twenty-four recovered, or 63.15 per cent. This is certainly a result not to be boasted of; but of sixty-one cases treated by the clamp thirty-five recovered, and twenty-six died; i. e., only 57.37 per cent. recovered.

In view of the preceding facts and figures, I do not share in the apprehensions, upon this point, of the most distinguished of American ovariotomists, who recently stated that he "would not, if possible to avoid it, leave any foreign substance in the peritoneal cavity, since it is impossible to predict what the consequences may be."[2]

Dr. J. T. Bradford, however, who has always used the ligature, and has thus achieved the highest success yet attained, having saved ninety per cent. of his cases, as we have seen (p. 248), remarks on this subject as follows:[3]

> The mode of treating the pedicle in most extravagant use, and the more fashionable one, perhaps, is the clamp. . . .
>
> In my last ten or twelve operations I have carried with me Mr. T. Spencer Wells's clamp, intending to be fashionable, if possible, but confess sincerely (much as I admire its great originator) that in no case could I get my own consent to use the clamp, even where the pedicle was of moderate length.

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[1] *The Lancet*, August, 1867, p. 515.

[2] *American Journal of Medical Sciences*, October, 1870, p. 430.

[3] Posthumous papers sent me by his son.

> On careful examination of his third one hundred cases, in which Mr. Wells used the clamp most frequently, it will be seen that, in proportion to the complicated character of the case, does he lay aside the clamp, and either use the ligature, or the cautery, or both. I am forced to the well-matured conclusion that if Mr. Wells, accomplished as he is, not only in literature but in science, with his abundant resources of material, . . . had confined himself to the original McDowell method of retaining the ligature outside the abdomen, or to the Tyler Smith method of cutting short the ligature, and returning it into the abdomen, with his acknowledged zeal and ability, his success would have been even greater than his present record; . . . . and I venture the humble prediction that, in five years, the clamp will be the least in use of the four great methods of securing the pedicle.

Having thus shown that the ligature, as an exclusive method, succeeds even better than the combination of the clamp and the ligature, the question next arises whether the ends of the ligatures should be left coming through the incision, as was always practised, with the few exceptions which have been noticed, up to about 1850; or should be cut close to the knots, and the incision closed, as first practised by Dr. Nathan Smith in 1821, "and rescued from desuetude by the energy of Dr. W. Tyler Smith," forty years afterward.[1]

It has been objected to Dr. N. Smith's method that the loop left around the pedicle may become detached and migrate to different parts of the peritoneal cavity, and produce foci of suppuration, wherever it chances to stop. Hence it has been predicted that the future history of patients thus treated will be found to be very unsatisfactory. The only cases, so far as I know, which go to substantiate this apprehension, are the following: In one of Mr. Bryant's cases[2] the loop is said to have caused an artificial anus, whence, however, it was finally thrown off on the twenty-ninth day, and the wound had healed in three days more.[3] In another of his cases, a fatal one, in which some half-dozen ligatures (mostly around adhesions) had been left in the peritoneal cavity, they were found "resting in their own depots of pus, having been thrown off from their attachments, and acting as foreign bodies." In one of my cases the ligatures were thrown out from an abscess, five months after ovariotomy. The patient recovered. These are, however, the very rare, exceptional cases, like those in which the clamp is retracted into the abdomen and causes death, as in Dr. Hodder's case;[1] and cannot therefore be fairly quoted against the method of Dr. N. Smith. When Mr. Bryant had treated twenty-four cases in this way, he remarked that he had never had any untoward result which was clearly due to the practice itself.[2]

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[1] Dr. D. L. Roberts's remarks in Manchester (England) *Medical and Surgical Reporter*, October, 1871, p. 94.

[2] "Guy's Hospital Reports," Third Series, vol. xiv., 1860, p. 228.

[3] If the ligature produced artificial anus, why did it not enter the bowel and be expelled *per anum naturalem?*

The statistics of this method of using the ligature also contradict the objections just specified. Of nineteen cases,[3] treated by Dr. W. Tyler Smith, four died. In ten of these the ligature was cut close to the knot, and only one died. Of ten cases operated on in this way by Dr. Sims also, only one died. Spiegelberg operated thus in ten cases, and lost two patients. Of twenty cases of my own, six have died—all, however, being very unpromising cases. But Dr. Charles Clay, Dr. Dunlap, and most of the rest I have quoted as using the ligature, always bring the ends out through the incision.

The thirty-eight cases I have quoted from Wagner gave the best percentage of success achieved in Germany, 63.15 per cent., and in all these the ligatures were cut close to the knot, and the incision closed. Grenser admits that this is the best method for all cases, unless the pedicle be long, thick, and vascular; when he recommends the clamp (p. 48). Spiegelberg concluded, in 1870, that this is "a valuable procedure, and a method which includes within itself no danger, except from accessory circumstances."[4] Up to the present time the majority in Germany, as in England, prefer the extra-peritoneal method, and especially the clamp. The method under consideration is, however, gaining ground in both those countries, and in this also. Among the London hospitals, I mention Guy's as one in which this method is preferred. Ten cases have also been recently reported as thus treated at the London Hospital for Women, of which six recovered.[5]

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[1] *The Lancet*, January, 1871, p. 41.

[2] "Guy's Hospital Reports," vol. xiv., 1869, p. 232.

[3] "Obstetrical Transactions," vols. iii., iv., vi.

[4] "Archiv für Gynaekologie," vol. i., 1870.

[5] *The Lancet*, June, 1872, p. 323.

Finally, I speak of the **various kinds of ligatures and clamps** which have been used, and the **manner of applying them**:

1. Ligatures have been applied to the pedicle, of silk, leather, the intestine of the silk-worm, hemp, horse-hair, silver and iron wire, and carbolized catgut.[1]

Dr. Charles Clay at first used stay-makers' silk for ligatures, but has for several years past preferred well-waxed Indian hemp, as less likely to slip. I have always used silk, well waxed, but not twisted; and have never had a ligature slip. I more recently carbolize the silk, and prefer it to the catgut, as admitting of being tied in a firmer knot. Theoretically, however, the latter may be partially or entirely absorbed, after fulfilling its mission. To metallic ligatures of all kinds I object, since they are tightened by torsion, and which should never be trusted for arresting hæmorrhage, a knot alone being reliable. I have seen no less than six silver ligatures applied to a single pedicle of average size, because one after another failed to stop the bleeding. The double silk ligature would have accomplished the object with certainty in much less than one-sixth part of the time. I have frequently seen the silver wire ligature fail entirely, and the silk ligature applied at last. Why not apply it at first? The objection to the horse-hair and the silk-worm's intestine is also that they are not easily tied in a firm knot.

Thus I consider carbolized silk or hemp to be the best ligature for the pedicle; while I also agree with Mr. Wells, that the size of the needle, the size and smoothness of the thread or silk, and the tightness with which it is tied, are important points to be observed.

In **applying ligatures**, the pedicle is usually divided into two equal parts, each included in a single ligature. If very wide (over six inches), it is safer to divide it into three portions. In the former case a double ligature of three or four strands of saddlers' silk, or its equivalent in hemp, is carried through the centre of the ligature, and then cut into two equal portions; and with each of these one-half of the pedicle is firmly tied. The pedicle is then cut off with scissors (or knife) as far as possible from the ligatures—and the tumor removed. Time is then taken to examine the vessels of the pedicle, and to cut off one or both ends of each of the ligatures, as may be decided. I prefer the needle represented by Fig. 47, for carrying the ligature through the pedicle; not the needle, but the use of it, being peculiar. Being permanently threaded with a loop of silk, as here represented, the needle is first pushed through the pedicle, and the loop raised by a forceps from the needle, when the ligature is passed to its middle, not through the eye of the needle, but between the loop of silk and the needle itself; and the ligature is pulled through the pedicle by the loop after the needle is withdrawn (Fig. 48).

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[1] Reported in February, 1871, by Dr. P. H. Watson, of Edinburgh.

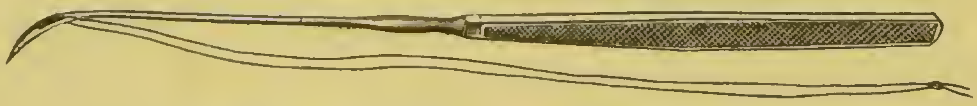

FIG. 47.—Needle for ligating Pedicle, and closing the Incision.

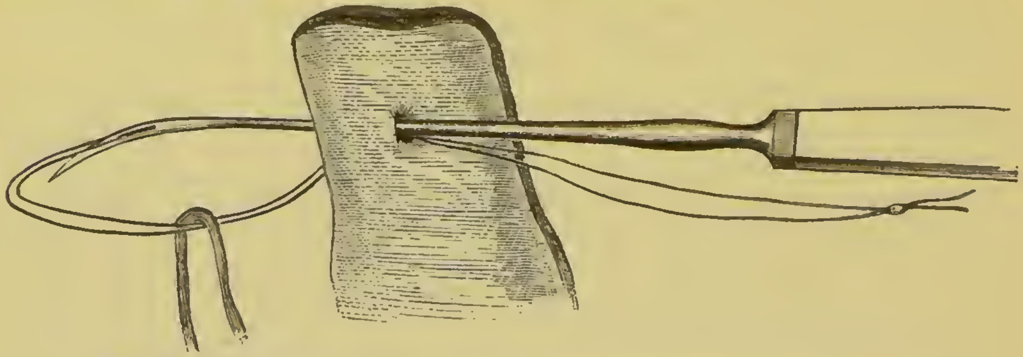

FIG. 48.—Showing the Application of the Ligatures to the Pedicle.

The following points must not be overlooked:

1. Pass the needle through the pedicle at a point where no vessels are visible, and as near the centre as may be. An aneurism-needle has been suggested, as having no point, instead of the needle I prefer.

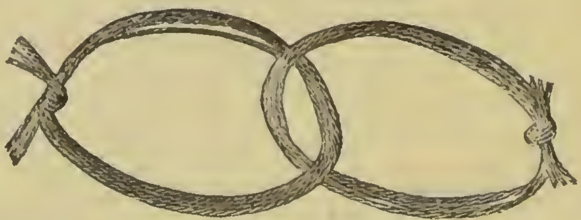

FIG. 49.—Showing Relation of the Two Loops around the Pedicle.

2. So adapt the size of the needle that the puncture made by it, and its loop of silk thread, shall be tightly fitted by the double ligature when drawn through it.

3. Let the point of passage of the needle be three-fourths of an inch at least, and more if possible, from the cyst—keeping also a half inch to three-fourths away from the uterus, if possible; and above all avoiding the plexus pampiniformis (p. 17).

4. If the pedicle is narrow (four inches or less), let the two ligatures interlace when tied, as shown in Fig. 49, that the two loops may be kept together. But, if the pedicle is six or eight inches wide, adherence to this rule may cause the ligatures to slip over the two angles of the pedicle. It is better to tie such a pedicle in three portions.

5. See that not the least traction is being made upon the pedicle at the moment when the ligatures are tied, since it may afterward slip through them. Dr. Bradford has seen this occur.[1] Mr. Solly found, in the *post-mortem* examination of his case, that the pedicle of the other ovary, which was about three times the natural size, could by moderate traction be stretched to double its length with a proportionately diminished thickness. Its former dimensions were at once restored when the traction was removed.[2]

6. Draw the ligature very tightly in tying it, if the pedicle be vascular. Mr. Phillips lost his case from not tying firmly enough. There need be no fear of strangulating the stump so as to produce gangrene; and the risk of slipping of the ligature must be guarded against. Besides, if the ligatures are to be brought out through the incision, they become sooner detached the more tightly they are tied, as Mr. Walne maintained.[3] In Mr. Solly's case, fatal from hæmorrhage in eleven hours, the ligature had not slipped off the pedicle, but the latter had merely contracted, so that the ligature was loose.

7. Do not cut the pedicle too near the ligature; from three-fourths of an inch to an inch, if possible.

8. Leave the ligatures uncut till ready to close the incision, as they easily guide to the position of the pedicle when we wish to examine it finally.

9. Do not make the least traction upon the ligatures, nor touch them, after the pedicle is tied, except to cut them.

10. Hold up the pedicle for examination by means of a te-

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[1] Report, p. 55.

[2] *London Medical Gazette*, June, 1846.

[3] Ibid., 1843, p. 49.

naculum, passed into the stump, of course above the ligatures. I have seen it, carelessly thrust in below, produce a bleeding which gave a great deal of trouble to arrest.

11. After all handling of the ligatures and sponging of the peritoneal cavity is over, cut the ligatures close to the knot, or otherwise, and let the pedicle fall into its normal position.

12. If one end of each of the ligatures is to be brought out through the incision, let these ends hang out six or eight inches. Mr. Walne, in his first case, left the ligatures protruding only two inches. They had disappeared at the first dressing, though they reappeared nineteen days afterward, and the patient recovered. Mr. Southam, in his first case, left the ligatures five inches long outside the incision. Tympanites supervening, they were drawn into the peritoneal cavity, and had not been seen again up to the time of the report of the case.[1] Chrysmar was the first who tied the pedicle in its two halves; before him, a single ligature had been passed round the whole pedicle.

The time required for ligatures left coming through the incisions, to become detached, varies in different cases. It averages three to four weeks, but was in one of my cases eighteen weeks. Gentle traction may be made daily, after the third week.

I close my remarks on the various methods of applying the ligature, with an account of a single application of the one proposed by myself (p. 445), the patient being a girl of seventeen years, who had never menstruated. The pedicle was four inches wide by two and a half inches long, and the instrument was applied as represented in Fig. 46; its distal extremity projecting one and a half inch beyond that of the stump. The ligature transfixed the pedicle one inch from its free extremity, and the tube (three inches long) one half an inch from its internal extremity. The incision, ten inches long, was closed by twenty silver sutures, and the tube left projecting from the abdominal cavity between the sixth and seventh from below, as shown by Fig. 50. Seventy-two hours after the operation the ligatures were divided by the knife (Fig. 42), and one of them at once removed. Very slight traction did not withdraw the tube or the other ligature, and they were left twenty-four hours more, when they were found perfectly loosened, and were removed. The suture next above and next below the aperture, through which the tube had passed, were then tightened, and the inner edges of the incision were united within the next twenty-four hours, and the patient rapidly recovered without a single unpleasant symptom.

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[1] *London Medical Gazette*, November 3, 1843, p. 204. They, however, were afterward detached, and the patient recovered.

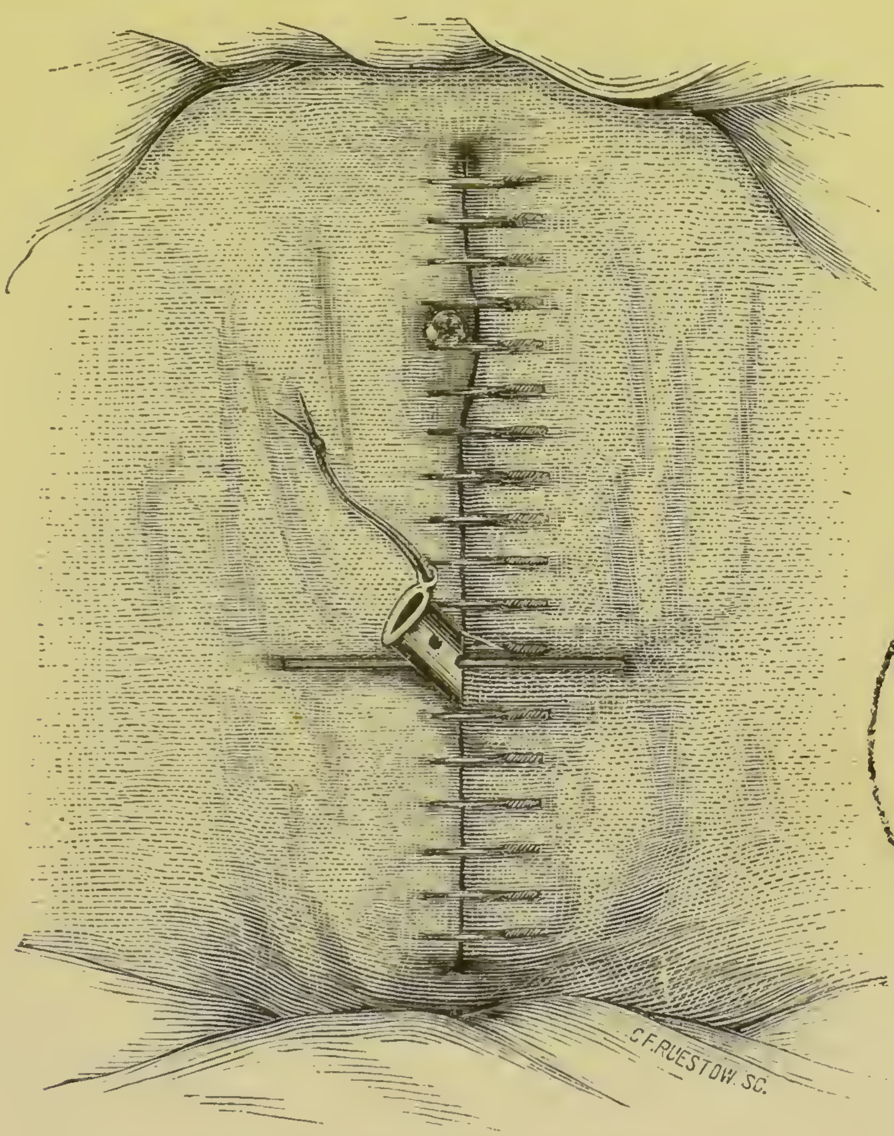

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FIG. 50.—Peaslee's Method of ligating the Pedicle.
The tube and ligatures seen as issuing from the peritoneal cavity.

This method has the very great advantage of being applicable to every case in which the pedicle can be tied by a ligature in two portions only, and of allowing the constriction of the pedicle to be removed at any instant. Generally, also, the ligatures and the tube can be removed at once, on dividing the ligatures. Further experience will doubtless decide that the constriction, in case the arteries of the pedicle are not larger than the radial, need not be continued more than from twenty-four to forty-eight hours; at the end of which time the exudation around the stump will not have become sufficiently firm to interfere with the immediate withdrawal of the instrument. Duplicate ligatures, one below the other, may also be used, if ever required.

2. Of the **forms of clamp** which have at various times been used, I mention only the following:

Mr. J. Hutchinson (in 1858) first used as a clamp a pair of carpenter's callipers. In his third case he first used his own clamp. Mr. T. S. Wells used his instrument with parallel blades, Fig. 41, from 1859 to 1869, and figured his circular instrument in the *Medical Times and Gazette*, October 30, 1869, p. 530. He has more recently discarded that, and returned to a modification of the original calliper form. This lies more accurately upon the abdomen, being concave upward, and occupies less space than the other form.[1] Dr. Graily Hewitt proposed a new clamp in 1870, of which the following is a description: "It consists of a framework of steel, shaped something like a shoe-buckle, measuring two and a half by one and one-eighth inches . . . . and is provided with studs or buttons eight in number, three on two sides, and one on each of the other two sides. It is used thus: the pedicle is perforated by a needle, bearing a double ligature of strong thread or whipcord in two or three places, according to the width of the pedicle; it is then tied in segments, the opposite ends being secured one by one to the framework which is now made to surround the pedicle, the cut edge of which is freely open to inspection and treatment."[2]

Dr. W. L. Atlee's clamp is shown by Figs. 51 and 52. It is described in the *American Journal of Medical Sciences*, April, 1871, p. 370. He claims for it the following advantages: "It is much smaller, lighter, and stronger than the older forms of clamp, and by its use the pedicle may be compressed in the

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[1] Dr. D. L. Roberts, in *Manchester Medical and Surgical Reporter*, October, 1871, p. 94.

[2] *British Medical Journal*, October 1, 1870.

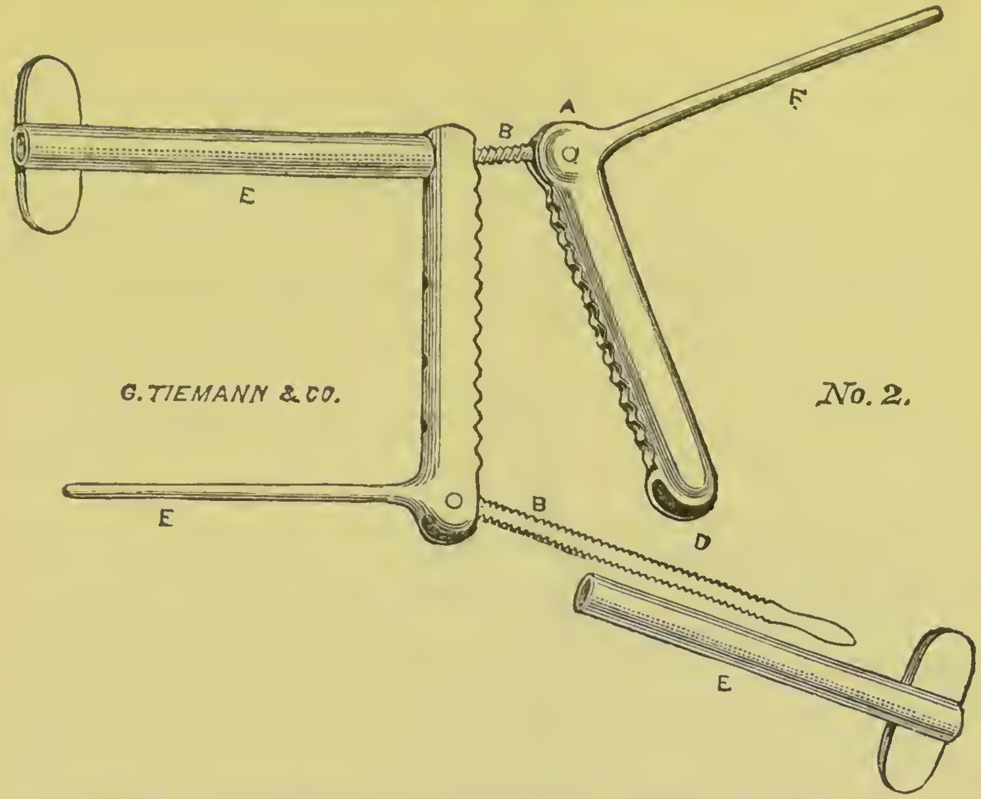

FIG. 51.—DR. ATLEE'S CLAMP, OPENED FOR APPLICATION TO THE PEDICLE.

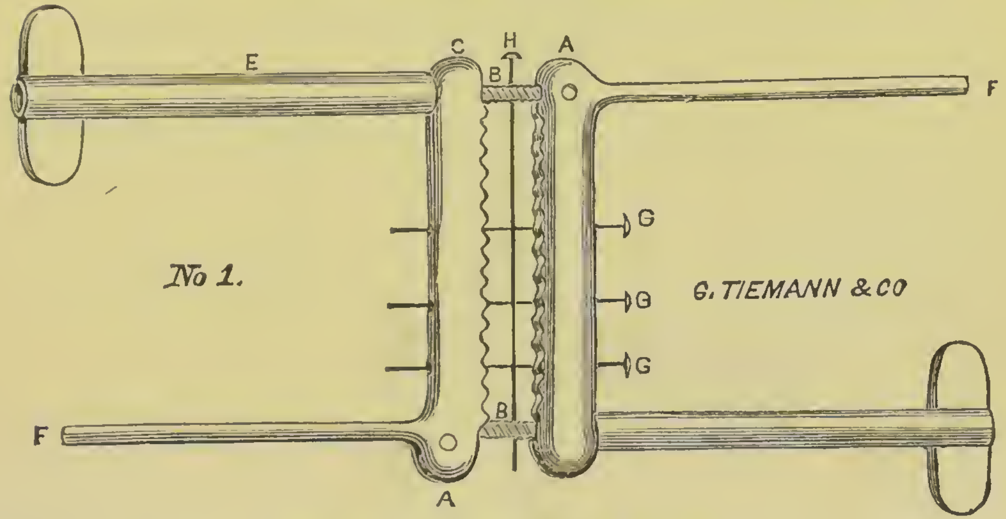

FIG. 52.—DR. ATLEE'S CLAMP, CLOSED.

The fenestra is only one inch and a quarter in length, and this can be reduced to one inch, three-fourths of an inch, and half an inch, according to the bulk of the pedicle, by merely shifting the pin to the corresponding holes through both blades of the clamp. In this way the clamp may be graduated to any-sized pedicle. As there is a hinge-joint at both ends of the clamp, the blades may be separated to any desired extent, in order to receive the pedicle. When slipped over the pedicle, the latter is enclosed in the fenestra by adjusting the screw B, in the slit D, after which the pedicle may be crowded into one end of the clamp, and the pin G inserted through one of the holes in the opposite blades, so as to shorten the fenestra in accordance with the size of the pedicle. When thus arranged, it is plain that, upon screwing the blades of the clamp together, the pedicle cannot spread beyond the pin G, and, at the same time, will be compressed in the smallest possible space. . . . . In adjusting the clamp, the graduating-pin should always be below the pedicle, toward the pubes, in order that the wound may be free for inspection above the pedicle.

One figure represents the clamp open to receive the pedicle, and the other figure shows its adjustment on the lower part of the wound, ready to be screwed up against the pedicle in its grasp. A A are hinge-joints, with the male screws B B attached. At C, one blade of the clamp is perforated, to allow the male screw B to pass through, while at D the other blade is slit open, to permit the other male screw B to be adjusted or detached. E E are tubular female screws, with thumb-pieces, which slip over the male screws to secure the plates of the clamp. F F are permanent arms, merely for the purpose of steadying and balancing the instrument when applied to the abdomen. G G G show the application of the pin at the respective distances required before screwing up the clamp against the pedicle. H H represent the wound after the clamp is adjusted and ready to be tightened. The engraving represents the exact size of the instrument.

smallest possible space, and, what is of paramount importance, in the *linear* direction of the wound, the direction most favorable for the approximation of its edges."

Kœberlé's constrictor is shown by Fig. 43. It compresses the pedicle into a circular form, which I consider objectionable, from the unequal traction thus exerted upon its different portions. Dr. B. F. Dawson, of this city, has recently devised a clamp, shown by Fig. 53. It acts by approximating two semi-elliptical arms; and answers admirably for small pedicles and as a temporary compressor of the pedicle previously to the application of the ligature. Another valuable temporary clamp

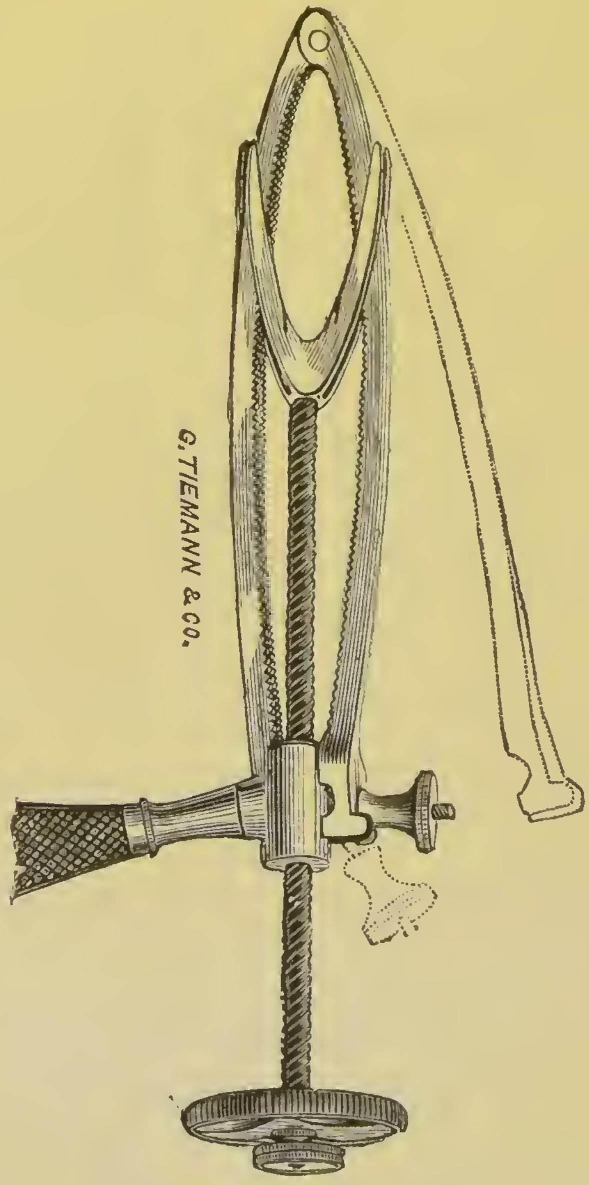

FIG. 53.—Dr. Dawson's Clamp.

is the "clamp shield" (Fig. 54) of Dr. H. R. Storer, of Boston, in use for several years past. In case the pedicle is sufficiently long, it is to be applied to it close to the tumor, and the latter at once removed; after which, the ligature, or the clamp, is applied leisurely and with precision. Dr. W. L. Atlee sometimes applies a ligature to condense the pedicle, if large, and afterward the clamp.[1]

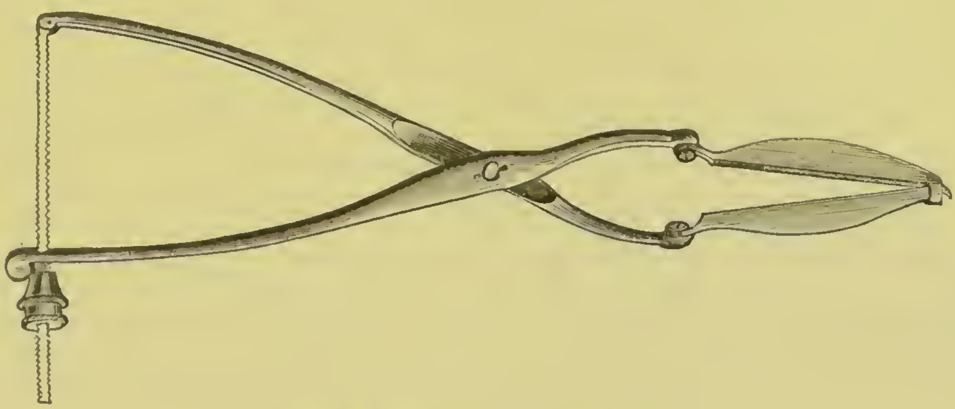

FIG. 54.—STORER'S CLAMP-SHIELD.

In regard to the manner of applying the clamp, but little need be said. It has been seen that it is adapted only to long pedicles, and it should be applied as near to the cyst as practicable. The latter being then cut away, the clamp itself is placed across the incision when the latter is closed, the end of the stump projecting between the blades of the clamp being painted with a solution of persulphate or perchloride of iron. This portion and all that is compressed between the blades of the clamp, of course sloughs off from the portion below, and falls together with the clamp in six or eight days in most cases, though the latter has been known to remain between three and four weeks. A permanent adhesion of the pedicle to the abdominal wall results, as has already been seen (p. 454).

Since all the preceding methods of treating the pedicle have given a fair degree of success, it must be inferred that success depends far more upon the general condition of the patient, and other points not at all connected with the pedicle, than upon the one I have been considering. Each method now most in use may have its advantages in particular cases, and the surgeon should be prepared to adopt the one he judges best in each instance. I have endeavored to give the facts on which the comparative merits of the methods most in use are up to the present time to be decided. The surgeon must, however, remember that, very rarely indeed, no pedicle at all is found, for the reason that the tumor has broken away from its original connections, and become attached to some portion of the peritoneal surface (p. 81). Mr. I. B. Brown reports a case in which an ovarian cyst was expelled through the incision by violent retching while he was performing ovariotomy, no attachment at all being discernible.[1] Dr. Wynn Williams partially removed a tumor, supposed to be a loose ovarian cyst, which had formed new connections. It had no attachment directly or indirectly to the uterus.[2] The right ovary in Mr. Wells's case No. 110 had no pedicle.[3] But some of the cases, reported as without any pedicle, are simply cysts attached directly to the uterus, or sessile cysts. Sometimes also the pedicle is so soft as to be crushed by the clamp or ligature, as in Mr. Wells's cases Nos. 36 and 60, and in one of my own, in which all of its bleeding vessels were finally ligated separately. The patient recovered. In Mr. Wells's case No. 106 the pedicle was twisted, being long, and only as wide as a finger, though the tumor was not a solid one. Thus becoming very œdematous, it presented the appearance of containing small cysts.[4]

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[1] *American Journal of Medical Sciences*, October, 1870, p. 430.

SECTION V.

EXAMINATION OF THE REMAINING OVARY, AND CLEANSING THE PERITONEAL CAVITY.

1. The comparative frequency of coexistent cystic disease of both ovaries has already been alluded to (p. 365), as well as the fact that they are almost always in different stages of the disease. Kœberlé would assume that both are diseased in case of hereditary tendency to cystic degeneration.[5] If the second ovary has attained the size of a goose-egg, it can hardly fail to attract attention, but the ovariotomist must never omit to examine it as soon as the tumor is removed. This should also be

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[1] *The Lancet*, 1854, vol. i., p. 365.

[2] "Obstetrical Transactions," vol. viii., p. 218.

[3] *Op. cit.*, p. 295.

[4] *Op. cit.*, p. 283.

[5] "Opérations d'Ovariotomie," p. 40.

very carefully done, since otherwise important disease may be entirely overlooked, and a second ovariotomy be subsequently necessitated. And the two following mistakes are to be especially avoided :

a. A very small monocyst may be mistaken for an ovisac just ready to burst, and which, being left intact, may in time demand extirpation. Unless the operator is quite certain that the enlargement is an ovisac, it should be treated as a cyst, in one of the methods following, since no harm ensues in that case if it were actually an ovisac. If the cyst be more than half an inch in diameter (p. 10), or, if its contents be not transparent, it is pretty certainly not an ovisac.

b. The ovary may first become atrophied, and subsequently the seat of cystic degeneration. This occurred in one of Spiegelberg's cases. The cyst was as large as a dove's-egg, but, since the whole mass of the ovary was very nearly normal, he, judging from its size, entirely overlooked the cystic disease.

The treatment demanded by the remaining ovary, if the seat of cystic disease, will depend on its extent, and degree of development. If such disease be combined with atrophy, as in Spiegelberg's case, entire removal is the remedy. And, if the ovary have become a mass of cysts, though still quite small, or, if there be two or three cysts, giving it the size of a hen's-egg, the same treatment is demanded.

But entire excision should be avoided, if possible. Dr. Keith left a slightly degenerated cyst in the remaining ovary in one instance, and the patient gave birth to a child a few years afterward.[1] And, if there be but a single cyst, or even two or three cysts, of the size of a pea or less, the whole organ need not be sacrificed, though each separate cyst is to be dealt with in a manner to prevent any further development.

Mr. I. B. Brown burns the cyst with the hot iron, and with good results. Mr. Wells has punctured two cysts in the second ovary, distended by clots, and as large as cherries, and the patient subsequently recovered, married, and had a child twenty-two months after the operation.[2] I have always cut away the cyst as far as I could without producing hæmorrhage, with fine curved scissors, and have seen no further trouble. If any blood flowed, I have barely moistened the surface with a pointed glass rod, dipped in Monsel's solution of the persulphate of iron. Kœberlé found slight disease (one or several small cysts) of the second ovary in eleven cases out of sixty-nine.[1] He broke up the cysts, so as to leave no part suspected of cystic degeneration after the operation.

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[1] Grenser, p. 28.

[2] Case 112, p. 307.

In Kœberlé's third case, the remaining ovary (the right) was as large as a small egg, but, much to his regret, could not be removed. It attained to a size to require tapping between five and six years afterward, and he proposed to use the iodine-injection as a means of temporary relief.[2]

The following is a case of great interest in which the remaining ovary was examined, both as showing the effects of violent emotional excitement after ovariotomy (p. 359), and as affording data for deciding how long a time is required for the development of an ovarian oligocyst up to the size of a child's head. It is reported by Dr. Ed. M. Hodder, of Toronto.[3]

The patient was thirty-two years of age, and ovariotomy was performed by Dr. Hodder, the pedicle being secured by ligatures, the ends of which were brought out at the lower angle of the wound. Nothing of moment occurred during the operation, from which she rallied well. The opposite ovary was examined, and found to be quite healthy in size and appearance. On the fourth day after the operation, a tumor, the size of an orange, could be distinctly felt in the site of the remaining ovary, which seemed difficult to account for. Upon inquiry, however, it was found that, about two or three hours previously, she had given way to such violent passion that it was described as a perfect fit of frenzy. On the fifth day thereafter she had another similar paroxysm, from which, however, she did not seem to experience any harm. On examination, twenty-six days afterward, the tumor was found to have much increased in size, though it caused no pain or inconvenience. But some months afterward the enlargement was reported by her husband to have entirely disappeared. The operation was performed April 30, 1868.

In February, 1870, she was safely delivered of a healthy boy. On June 20, 1871, after nursing her child thirteen months, Dr. Hodder found on examination that the remaining ovary was now as large as a child's head; and on June 24th this ovary also was removed, and she made a good recovery. This amount of development must, therefore, have obtained within three years from its commencement, at the longest.

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[1] *Gazette Hebdomadaire*, Août, 1868, p. 504.

[2] Ibid., p. 498.

[3] *Canada Lancet*, June, 1872, vol. iv., p. 448.

2. **To thoroughly cleanse the peritoneal cavity** of all fluid left there by the operation, before closing the incision, I hold to be one of the plainest and most important principles of ovariotomy. Grenser considers it the chief necessity for securing a happy result.[1] Some, however, attach to it no importance, except so far as blood or colloid fluid is concerned (I. B. Brown and Mr. Bryant); and the grounds of this precept should be specified.

The fluids left in the peritoneal cavity at the close of the operation are: blood, cystic fluid, ascitic fluid, or a mixture of any two or of all of these; and the reason for the removal is, that otherwise they may produce peritonitis or septicæmia, which are the two most frequent causes of a fatal result.

a. If the fluid remaining be blood alone, it may not produce peritonitis, as it does not in many cases of hæmatocele; and it may not undergo decomposition, and thus induce septicæmia. But it is well known to have produced both these effects in many cases, and hence should in all cases be removed. It produced fatal septicæmia in my eighth case (Chapter VIII., Section II.).

b. Ascitic fluid remaining after the operation will not produce peritonitis, since the peritonæum is accustomed to its presence, but it is very liable to undergo decomposition, and then to induce septicæmia. The first case of septicæmia after ovariotomy which occurred to myself was produced in this way. It should, therefore, be entirely removed from the peritoneal cavity before closing the incision.

c. We have seen that the fluid of an oligocyst is generally not irritating to the peritonæum (p. 74), though it not very seldom is so. It may, however, ultimately, and after becoming decomposed, produce septicæmia, like the ascitic fluid. The fluid of a polycyst is always irritating to the peritonæum, and usually produces peritonitis (p. 75). Secondarily, it also may produce septicæmia. Cystic fluid should, therefore, not be left in the peritoneal cavity.

If neither of the fluids just mentioned should be left, a mixture of them should of course not be. And I am aware of no real objection to the manipulations necessary to effect this object, though their dangers have been paraded by those who do not apply them. It should be an object with every operator to prevent blood and cystic fluid from entering the peritoneal cavity if possible, as has been already inculcated, and thus to avoid the necessity of removing them.

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[1] *Richmond and Louisville Journal*, April, 1871, p. 384.

Dr. McDowell, in his first operation, turned the patient on the side to remove the blood from the peritoneal cavity (p. 237); and this is always judicious if there be much fluid there of any kind.

Some object to the use of the sponge for cleansing the peritoneal cavity, since it naturally contains foreign matter of a very irritating nature; which objection is answered by a proper preparation of the sponges to be used. Flannel has also been used to absorb the fluid from the peritonæum, and especially from the pelvic cavity; the woolly fibres of which are quite as likely to be left behind as any thing from a well-prepared sponge. The latter should not only be perfectly new and clean, but it must be originally of the firmest and finest quality, and specially prepared for this use. Kœberlé, who attaches much importance to this point, as contributing to a successful result of the operation, first puts the sponges into a weak solution of nitric acid, then of carbonate of soda, and finally has them washed very thoroughly in alcohol.[1] He also boils the water in which they are to be cleansed, in order to destroy the microzoa they may contain, and never uses infusions or vegetable decoctions, which he considers more pernicious than useful.

The sponges being properly prepared, I adopt the following precautions:

a. To use only sponges as large at least as a hen's-egg, noting their number before commencing; since a sponge has in more than one instance been left in the peritoneal cavity by mistake, and even if this precaution has been taken. Prof. Braun, of Vienna, relates a case fatal from hæmorrhage twenty-three hours after the operation, in which a sponge was found at the *post-mortem* examination. It must have been torn off from a larger one, since all the sponges used had been numbered.[2]

b. To use the *same* sponge from time to time, till the fluid is very nearly removed, not stopping to wash it at all, but merely having it repeatedly squeezed by the carefully-cleansed hand of an assistant each time it is removed from the peritoneal cavity. Then to change to a clean one, in order to remove the last of the fluid, and leave the peritonæum perfectly cleansed. I prefer to introduce the sponge by means of the long uterine forceps, and do not use more than two or three in all.

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[1] "Opérations d'Ovariotomie," p. 21, note.

[2] Wiener *Wochenschrift*, Nos. 23, 24.

c. In applying the sponge, I carry the fingers of the left hand to the bottom of the pelvis, the palm being presented forward upon the posterior surface of the uterus, and kept in this position till the sponging is completed. Thus, the sponge is not allowed to touch the uterus nor the pedicle at all, it being pressed down into the pelvis upon the back of the hand; the convolutions of intestine being held up from the pelvis in the mean time by a wire speculum in the hand of an assistant, if necessary. The cleansing of the peritoneal cavity having been satisfactorily effected, and all oozing of blood from every source having ceased, the operation is concluded by closing the abdominal incision.

SECTION VI.

CLOSURE OF THE INCISION, AND THE DRESSINGS.

Before closing the incision, Dr. Atlee advises always to examine the patient *per vaginam*, and with the uterine sound; since tumors other than ovarian may still remain in the pelvis which otherwise may be overlooked. In more than one instance, also, a tumor other than ovarian has been removed by mistake, and which was only detected at the *post mortem;* while a vaginal examination, aided by the sound, would at once have discovered the fact. If a small outgrowing fibroid is detected, the temptation will be strong to remove it, but such a decision must not be hastily formed. Mr. Wells advises, after the results of his seventy-second and eighty-eighth cases, to leave such a tumor undisturbed.

The small intestine must also have been returned in such a way as to guard against all twisting of the convolutions one upon another, and consequent obstruction and tympanites.

A. Proceeding finally to *close the abdominal incision*, two questions present themselves:

1. What material is to be preferred with which to make the sutures?

2. Shall the peritonæum be included by them?

1. **Metallic sutures** are now very commonly used, in all countries; generally of silver or iron wire, but sometimes platinum and gold have been substituted. It is claimed for the metallic suture that it does not produce ulceration and suppuration around it; but this depends on circumstances. Any kind of suture, if applied too tightly, causes ulceration of course, and the mere contact of any suture may produce suppuration, in case the vital energy of the patient is very much exhausted before the operation. Metallic sutures are, therefore, quite as liable as the silk or hemp suture to produce ulceration in inexperienced hands, since it is not so easy to adjust the former with precision by torsion as the latter by tying a knot. Experience, however, should rectify this. I do not use the twister, however, in tightening the sutures of silver wire; but, bringing the edges of the skin together by traction upon the wire, I then make a turn of its ends upon the surface at once, and secure the precise degree of tightness judged requisite. As many more turns as are deemed necessary are afterward made upon the first, each being, of course, farther from the skin than the preceding one. Dr. W. L. Atlee, however, prefers the iron wire for this purpose.

Martin, Stilling, Spiegelberg, and others, have observed free suppuration around the sutures after the use of metallic wires; and Mr. Wells and Dr. Keith, of late, have used silk instead, frequently allowing it to remain eight to ten days, without causing the slightest irritation.[1] Within the last year, however, the latter has used, with great satisfaction, the carbolized catgut, as proposed by Dr. Watson, of Edinburgh. He finds that it usually does not produce the least irritation, and is gradually absorbed, except the knots, which drop off in eight to ten days.

Whatever be the substance used for the sutures, I prefer to introduce them by means of the needle shown by Fig. 47; both because they can be introduced more rapidly in this way than in any other with which I am acquainted, and especially because they can thus be inserted with precision; since any required amount of strength can be applied to the needle without any danger of its changing its direction.

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[1] Grenser, p. 24.

2. The **inclusion of the peritonæum** by the sutures which close the incision was first practised by Dr. Alban G. Smith, in 1823 (p. 242). It was first insisted upon by Mr. Wells, as very important, in 1859.[1] It is objected to by Dr. Charles Clay, Mr. I. B. Brown, M. Kœberlé, Dr. A. Dunlap, and a few others. It is always practised, and considered very important, by Mr. Wells, Dr. Keith, and most operators in this country and Great Britain. Mr. Brown objects that the sutures may produce suppuration of the peritonæum—a very rare condition, I think, at least as thus induced. Dr. Dunlap remarks that "in passing the needle, you frequently puncture small vessels, and a considerable amount of blood is poured out along the ligatures. If, then, the needle entered the cavity of the abdomen, which it must do, to enclose the peritonæum, this blood would be as likely to flow internally as externally, and might, by its presence there, be a source of grave disturbance."[2] The success of the operation does not turn, certainly in most cases, on this point, and most operators, previously to 1850, avoided the peritonæum when introducing the sutures, and Dr. Dunlap has himself succeeded in forty-eight out of sixty ovariotomies. The idea, however, can no longer be advanced that peritonitis is risked by including the peritonæum, and the following advantages far more than counterbalance any disadvantages I am aware of:

a. There may be bleeding of the vessels of the sub-peritoneal areolar tissue, the blood falling directly into the peritoneal cavity if the peritonæum is not included in the sutures. Dr. Dunlap fears that, if it be included, blood from the suture would fall at once into the peritoneal cavity. But here a distinction must be made. Bleeding may result in the sub-peritoneal layer either from the original division of the vessels, or from puncturing with the needle. In the former case, including the peritonæum would entirely prevent the blood falling into the peritoneal cavity; and, in the latter, the blood would certainly fall into that cavity, if the peritonæum were not included. On the other hand, if the needle goes through the peritonæum also, and produces bleeding, Dr. Dunlap's objection might seem to hold. In fact, however, no case of internal hæmorrhage, from such a cause, has ever been reported. On the contrary, this is the way to prevent it. In the third case of Dr. W. T. Smith, who always includes the peritonæum, a free hæmorrhage occurred from a puncture from the needle traversing the rectus muscle, and which ceased on tightening the suture. But there was no reason for the belief that any blood passed into the peritoneal cavity. Six days afterward, a free hæmorrhage again occurred from the same vessel, when the suture was removed. This time the bleeding was arrested by pressure with the tip of the finger, and then there was no sign of the blood entering the peritoneal cavity. There was no opportunity for a *post-mortem* examination, since the patient recovered.[1]

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[1] *Op. cit.*, Case 5, p. 20.

[2] Paper read before Ohio State Medical Society, p. 15.

Of course, the needle is not to be so large but that its puncture is completely filled by the silk it carries. And, if so, no blood can issue after the latter is introduced. Besides, if the peritonæum is included, and its two surfaces in contact united, no matter can then pass into the peritoneal cavity, even if it forms in the course, and by the side, of the sutures themselves.

b. Adhesions of the small intestine occur over the entire surface left uncovered by the peritonæum. Dr. Dunlap well suggests that, "if Nature will take care of these large patches, sometimes three or four inches wide, on the walls of the abdomen, which have been denuded of the peritonæum (by the detachment of adhesions), by reforming it, or covering it with a new material, which will answer all her purposes, why not leave the narrow strip along the cut to her care?"[2] Nature will doubtless do the best possible, if the surface be left denuded of peritonæum; and will treat that surface precisely as she does the surfaces whence adhesions have been torn away. In both cases she will supply a peritonæum from the small intestine in the manner just explained. But we do not invoke such adhesions in the one case, nor the other, since no possible advantage can, and much possible disadvantage may, result—as I need not explain. In view of a possible repetition of ovariotomy on the same patient, such adhesions on the line of the first incision are of great moment. In Boinet's case, he having included the peritonæum in his sutures, no trace of the first incision was presented on the peritoneal surface at the second operation, and no adhesions existed. In the case of Dr. Caswell, of Providence, already mentioned (p. 363), the small intestine was adherent in the middle line, and, had his second incision been made very near to the first, he would, as he remarks, have performed enterotomy, instead of ovariotomy.

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[1] "Obstetrical Transactions," vol. iii., p. 49.

[2] *Loc. cit.*, p. 15.

c. But a still more serious accident may occur if the peritonæum be not included in the sutures. If adhesion of the small intestine does not promptly ensue over the whole denuded surface, suppuration will occur upon it, and, of course, the pus falls into the peritoneal cavity at the risk of producing septicæmia. I very nearly lost my fifth case from septicæmia produced in this way, the abdominal walls being so thick that I could not keep the internal edges of the wound in accurate apposition.[1] Or, pus forming in the track of the incision may find its way through into the peritoneal cavity, with similar results, if the peritonæum has not been included. I have repeatedly had foci of pus form in the track of the incision, the latter lying open down to the peritonæum; but I have never had any special anxiety respecting its entrance into that cavity, since, if the peritonæum be included in the sutures, it unites firmly by the first intention, and, not being prone to suppuration, will not, for several days at least, reopen.

d. Finally, it is stated by Fehr that the peritonæum is sometimes so lax after much tension by the ovarian tumor as to fall into the peritoneal cavity, if it is not included in the sutures.

But the **recti muscles should also be included** in the sutures; or a ventral hernia may be the final result. If not included, the linea alba does not recover its original firmness, and the mass of intestines may gradually force the recti asunder, and thus protrude between them. I have myself had a single instance of this kind; and have seen several in the experience of others. In my own case,[2] the internal edges of the incision could not be kept in accurate apposition, from great thickness of the abdominal walls; although the peritonæum and the recti were included in the sutures, and the latter were applied but half an inch apart. It was a small protrusion at first, but, the patient being employed after her recovery in very hard labor, it became at length quite large. Mr. C. Hawkins mentions the case of a man stabbed through the abdominal walls by a small stiletto, who several years afterward had a fatal hernia occurring between the muscles and the integument.[1] After ovariotomy, however, strangulation in these circumstances is impossible; and a large protrusion can be prevented by seasonable and continued precautions.

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[1] *American Journal of Medical Sciences*, July, 1864. See Chap. VIII., Sec. ii., of this work.

[2] Ibid.

It scarcely needs to be added that great care must be taken to maintain the natural relations of the opposite edges of the incision, so that there may be no gathering of one side to make it correspond with the other, in closing the last two or three inches. There is no objection to placing the sutures within one-half inch of each other in any case; and they in no case need be any nearer than this. Some use both the deep and superficial sutures. The latter are unnecessary, if the former are near enough together to be relied upon; unless merely to bring the edges of the skin together, wherever they are found not to meet after the deep sutures are tightened. It is well to introduce all the deep sutures as rapidly as possible, not stopping to tighten any till all are in place. The anæsthetic may then be discontinued and the tightening afterward effected. I prefer, however, to let the patient feel the introduction of the last few sutures, since thus she is roused from the prostrating effects of the operation and the anæsthetic, and sooner gets a satisfactory reaction.

If there be ground to apprehend internal bleeding from surfaces whence adhesions have been detached, I introduce a tent four lines in diameter and two inches long, between the two sutures at the lower end of the incision; to be removed in from forty-eight to ninety-six hours, according to the circumstances to be detailed in the chapter respecting the after-treatment.

Kœberlé's method of closing the incision is somewhat elaborate, and is shown, together with his management of the pedicle, by Fig. 55. Finally, Breslau, of Zurich, after extirpating a gangrenous cyst, did not close the incision at all; but, fearing septicæmia, he united the thickened margin of the peritonæum to the skin on the same side. The patient recovered in fifty-seven days.[1]

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[1] *London Medical Gazette*, October 30, 1846, p. 739.

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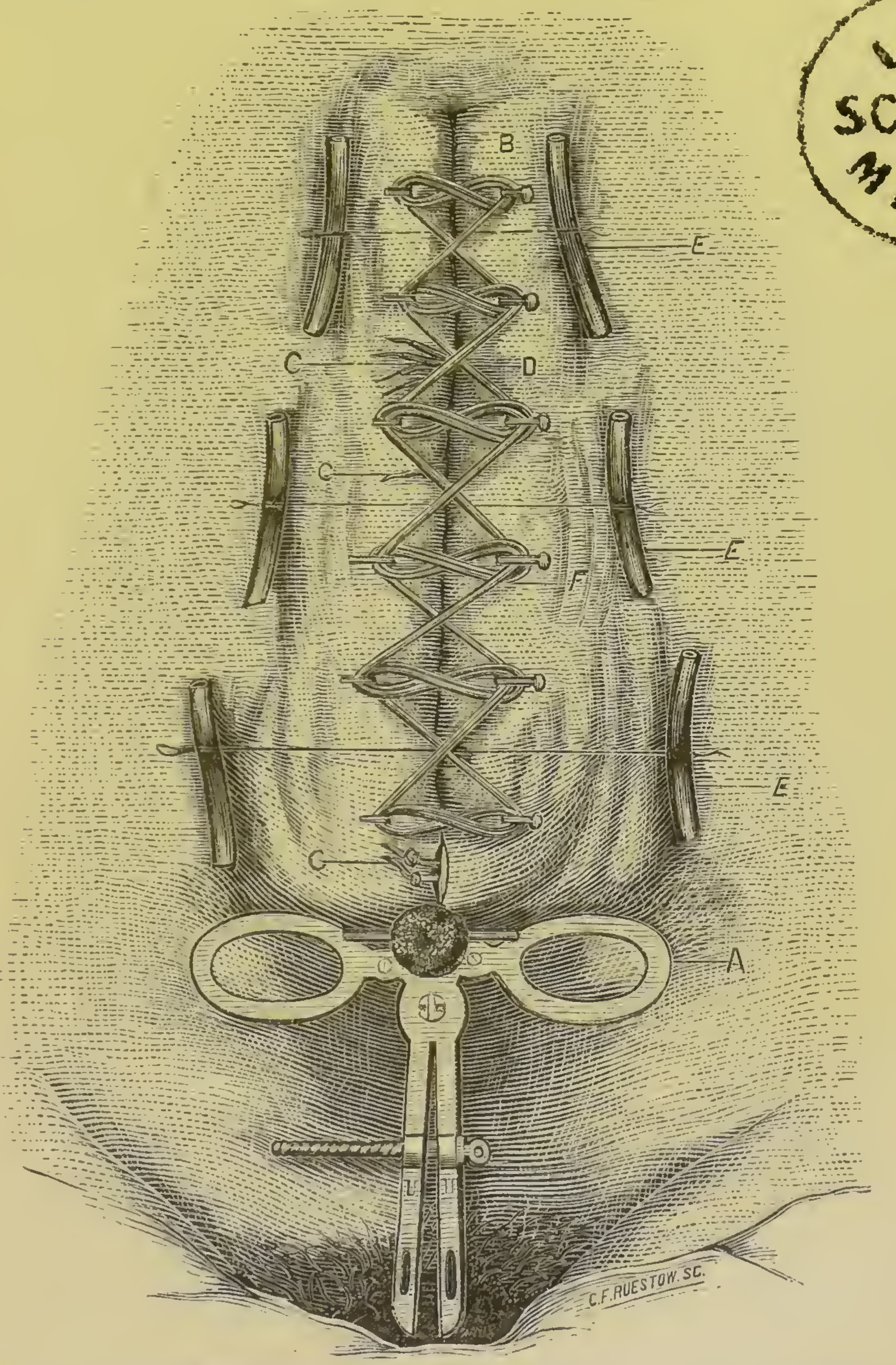

FIG. 55.—Koeberlé's Method of treating the Pedicle and closing the Incision.

A, clamp constricting the pedicle, which is also transfixed by a steel pin. B, incision. C, ligatures from adhesions and omentum. D, umbilicus. E, deep sutures. F, superficial sutures.

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[1] Grenser, p. 58.

B. In respect to the **dressings to be applied** after the incision is closed, different operators have varied. If the clamp has been used, the stump of the pedicle is first to be painted over with the persulphate or the perchloride of iron, and then the dressings are applied. Dr. Black applied somewhat elaborate fomentations of poppy-capsules, camomile, etc.,[1] frequently changed; and thought them very efficacious in conducing to the patient's recovery. Dr. Atlee and Mr. I. B. Brown formerly applied the many-tailed flannel bandage; and Mr. Wells the simple bandage of flannel over carded cotton. In Germany some operators apply ice to the abdomen, as preventing exudation and tympanites, and being very comfortable to the patient. In this country and in Great Britain warmth is applied, as still more comfortable. I would defer cold applications till great heat of the abdominal surface arises; and consider the following dressing all that is required:

1. A bandage of adhesive plaster around the abdomen, as first suggested, I think, by Prof. J. P. White, of Buffalo; two or three strips five inches wide, and long enough to surround the abdomen. This gives great comfort and support, and is very efficient in preventing tympanites, which is so often a symptom very difficult of management. It should remain at least a week, unless it becomes uncomfortably tight to the patient. I have had patients insist upon retaining it for two and even three weeks. No adhesive straps need be applied in the usual way.

2. A compress wrung in warm water, covered with oil-silk, to be changed every twelve hours; and upon this a dry compress large enough to give some degree of rotundity to the collapsed abdomen.

3. A double flannel bandage over all the preceding.

4. Clean clothes having also been put on, so far as may be done without disturbing the trunk of the patient, she is at length put into a bed between warm blankets,[2] with other ample warm coverings, and with rubber bottles of hot water placed at her feet. It is a valuable suggestion of Dr. D. Lloyd

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[1] *The Lancet*, October, 1863, p. 649.

[2] Mr. Bankhead sewed up his patient after ovariotomy in a flannel roller. (*The Lancet*, 1868, p. 492.)

Roberts, of St. Mary's Hospital, Manchester, England, that the patient be carried to her bed with the utmost care, since the least concussion may produce vomiting.[1]

Thus it is evident that the success of ovariotomy does not depend upon the performance, however skilful, of any single step of the operation, but on the bestowal of the greatest care upon all its details. On the other hand, a fatal result may be determined by a want of care and skill in respect to any one of the stages which have been described. Dr. Keith, in reply to a direct question, writes[2] as follows: "You ask me to what I attribute my results. I cannot tell. I wish I could. I do the best I can for each individual case, give my mind to every case. . . . do the operation as carefully as I can, and lose as little time as possible in the doing of it, consistent with stopping all bleeding." Equal care and skill are also required in the after-treatment, in complicated cases; of which no one has given fuller proof than the operator just quoted.

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[1] *The Lancet*, vol. i., 1870, p. 190.

[2] January, 1872.

LEEDS SCHOOL OF MEDICINE

CHAPTER VIII.

THE TREATMENT AFTER OVARIOTOMY.

The surgeon who takes charge of a case after an ovariotomy performed by another, assumes much of the responsibility of the case, and four-fifths at least of the anxiety. Not that the after-treatment is more important than the operation itself in its influence on the result, or can atone for an operation badly performed; but an unfavorable result may in almost any complicated case be determined by a want of skill in the consecutive management of the case, however skilfully the operation may have been performed. I have therefore shown how desirable it is that the operator directly supervise the after-treatment, and have, till very recently, declined all cases of which it was not convenient to have the subsequent care. There are instances, however, in which a division of labor may accrue to the patient's benefit. "There are many," as Mr. Solly remarks, "who, after having performed the operation skilfully and successfully, have not the patience to attend to all the minor details on which the success of the operation appears mainly to depend."[1]

Until quite recently, however, very few, besides ovariotomists themselves, had any definite idea in regard to the treatment actually required after ovariotomy. And it is really wonderful, as Mr. Wells has remarked, that so many patients have outlived the after-treatment, when we consider how heroic it has sometimes been; venesection, leeching, bleeding, calomel-purging, and fasting, having all been tried with the greatest assiduity, and sometimes when a directly opposite course was required. I shall speak first of the general treatment, and then of the treatment demanded by the various symptoms and conditions as they arise.

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[1] Clinical lecture, *London Medical Gazette*, June, 1846.

SECTION I.

GENERAL TREATMENT AFTER OVARIOTOMY.

1. The dressings already mentioned are changed as required, two or three times in the twenty-four hours, perfect cleanliness being insisted on; warmth is applied till reaction is secured, and a comfortable temperature is afterward maintained. The catheter is introduced once in six hours (oftener if the patient demands it) for from forty-eight to ninety-six hours (five or six days—Dr. Clay), according to the symptoms, after which time, efforts at micturition are allowed. Quiet of body and mind is to be insisted on for the first five days, and opiates enough are to be administered to secure this object and overcome pain, and *no more.* The hypodermic injection of morphia, immediately after the operation, adds much to the depressing effect of the operation, and should be, as a rule, discountenanced. No one but the physician and necessary attendants should be admitted to the apartment during the first three days, even in the most favorable cases. The sutures are to be partly or wholly removed, if there be no tympanites, on the fourth day; the clamp becomes detached from the fourth to the tenth day.

2. The temperature of the room being 70° to even 80° during the operation, may be kept at about 65° after reaction is established. And the ventilation of the apartment should be perfect. Mr. Wells's patients, even in the winter months, were found lying with the window open, but the curtain down and the bed protected by a screen.

3. Very little nourishment is to be given the first seventy-two hours. I prefer to continue the milk-porridge, used before the operation (p. 398). I. B. Brown gives barley-water, or iced milk, or weak broths, and sometimes ale and a mutton-chop on the third day. Mr. Wells and Dr. Keith give barley-water mainly, but the latter gives no food at all till after flatus passes *per anum;* only a little cold water, or a few sips of very hot water. He gives soup-and-brandy enemas in the feeblest

cases.[1] Dr. Roberts advises as little food as possible the first forty-eight hours, to obviate sickness and vomiting.[2] No solid food is to be given, as Dr. Clay judiciously advises, until asked for by the patient. If the stomach is irritable, the nourishment as well as the opiate is to be administered *per rectum*, in which case beef-tea is a good substitute for the milk-porridge. The bowels are not expected to be relieved under seven or eight days, and are generally first unloaded by a large enema of soap-and-water. In the most favorable cases there is very little and sometimes there is no febrile excitement to require any form of medication. The patient sits up at the end of from fifteen to eighteen days, and returns to her home in four or five weeks. An abdominal bandage is required for about six months.

The general history of the progress of a case after ovariotomy is important. There are certain periodic changes to be expected, and the attending surgeon should watch for them, and be ready to contend successfully against those of fatal tendency. Dr. Charles Clay remarks that[3]—

> If the patient does not sink immediately from shock (that is, within the first twenty-four hours after the operation), the first critical day will be the third, and the cause of fatality, if the case so terminates, will be unsubdued inflammation.
>
> The next critical period is the sixth day, when I first apprehend danger after the subsidence of peritoneal inflammation (in the elder class of females particularly), from prostration; should, however, the case be young, this termination may be deferred to the ninth or next critical day, which is the usual period of prostration for younger females.
>
> If the patient passes this point, the case assumes a far more favorable prospect for recovery, and the critical days become of less consequence; nevertheless, I have seen the twelfth day usher in some very troublesome symptoms, consequent on the loosening or entirely throwing off the ligatures on the pedicle,[4] and in one or two cases I have seen (about this period) a secondary attack of peritoneal inflammation, or inflammation of the mucous membrane, which, if not carefully and actively managed, or foreseen and prevented, may wreck the patient. After this period I generally consider the case moderately safe, and have seldom been disappointed.

In exceptional cases no symptoms occur after ovariotomy which require any medication, except perhaps a small dose or two of an opiate in the first forty-eight hours. The following graphic account by Mr. Wells of the rapid convalescence, after ovariotomy, of a patient twenty years of age (Case 40), is no less truthful as applied to many other instances. His remarks were made at the Samaritan Hospital, July 14, 1862, just one week after the operation:

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[1] Letter, January, 1872.

[2] *Lancet*, February, 1870.

[3] "Obstetrical Transactions," vol. v., pp. 63, 64, 1864.

[4] A slight shivering, with febrile reaction, may be produced also, at about this time, by suppuration even around but a single suture, as in Mr. Wells's one hundred and tenth case (p. 296).

> The young girl, whom you now see looking so well and happy, is hardly to be recognized as the same person from whose abdomen some of you saw me remove, only last Monday, an ovarian tumor which weighed more than forty pounds. A week ago, she was a pale, emaciated girl, with the anxious, suffering expression, the compressed, elongated lips, the depressed angles of the mouth, the deep curved wrinkles around them, the widely-opened, sharply-defined nostrils, the prominent cheek-bones, the sunken eyes, the furrowed forehead, so often seen in the subjects of ovarian disease—pointing not only to such a loss of fat as leaves the bones and muscles almost as perceptible as if they had been dissected, but also to something more—to the heavy weight the patient has to carry in a situation impeding respiration, and preventing free action of the diaphragm—for the tumor encroaches on the thoracic cavity, displaces both lungs and heart, and interferes with their functions. Now all this morbid physiognomy has disappeared. It disappeared, indeed, a few hours after the removal of the tumor. Even a casual observer would then have seen that the girl had been relieved of a great load; and since then day by day, as she has had to speak thankfully of quiet nights, of unwonted freedom of respiration, of absence of pain, and of returning appetite, so have we seen the color return to her lips and cheeks, the eyes brighten, and the furrows and wrinkles of premature emaciation begin to disappear, as the body has again begun to be nourished, since the drain upon the system caused by the rapid growth of the tumor has been stopped. At first, the sudden removal of such a strain seemed to be almost too much for the system; it seemed as if it were difficult for heart and lungs to play with even balance under so much lighter a task—the pulse was a little hurried, the face flushed, the skin rather hot. But soon we had a free perspiration, and all went well.[1]

One of my own patients had a still more remarkable recovery than the preceding. Being extremely emaciated and debilitated by a suppurating cyst containing sixty pounds of fluid, she nevertheless rallied within thirty minutes after the operation, and had no febrile reaction at all during her very rapid convalescence. Nor did she actually require any medicine at all, though she took a small dose of the liquor opii compositus the next morning after the operation, and another two or three days afterward, on both occasions for a slight pain from flatulence. She regained her appetite on the day after the operation; slept well every night; and made no complaint whatever during her recovery, except on account of the limited amount of food allowed her for the first few days. Her face indicated an increase of flesh within the first seventy-two hours, and regained its natural happy expression within the first twenty-four.

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[1] *Op. cit.*, pp. 117, 118.

But such are exceptional cases, and I proceed to consider the special symptoms and conditions which are liable to occur.

SECTION II.

TREATMENT OF SPECIAL SYMPTOMS AND CONDITIONS AFTER OVARIOTOMY.

Tympanites and vomiting are sometimes very distressing symptoms after ovariotomy, and demand very prompt attention. But the conditions which give the greatest apprehension, since they are the most common causes of a fatal result, are:

1. Shock and collapse.
2. Hæmorrhage.
3. Acute peritonitis.
4. Asthenic peritonitis.
5. Septicæmia.

I shall consider all the conditions just mentioned, in the order, in respect to time, in which they generally occur; and then speak of certain other accidental complications.

Dr. James Y. Simpson remarked that collapse is "an accident peculiarly liable to occur after operations or injuries about the pelvic organs; and no sufficient explanation of it has yet been supplied, nor does it even appear that sufficient attention has yet been given to it."

1. **Shock and collapse,** after ovariotomy, are much less frequent since, than before, the use of anæsthetics. And yet I have in more than one instance seen the latter produced by their careless administration, as explained on page 384. If the anæsthetic be administered cautiously, a knowledge of the patient's temperament and condition, at the time of the operation, will enable the surgeon to judge pretty accurately respecting the shock she will experience, it being increased, however,

somewhat in proportion to the length of time spent in the operation, and of course by the loss of a large amount of blood. If there is reason to apprehend danger from this source, the inhalation of the vapor of alcohol together with the anæsthetic is a judicious precaution; and there should be no hesitation in administering a stimulant as soon after the operation as the patient can swallow it. Warmth must also be assiduously applied till reaction is fairly established. After this has been once effected, the danger from shock has generally passed. Death from shock therefore generally occurs within the first twelve or twenty-four hours; though sometimes a state of collapse continues even forty-eight hours before a fatal termination. Any amount of a stimulant, cautiously given, may be regarded as too small till some reaction is seen to result from it; when it may, of course, be diminished. Concentrated fluid nourishment, such as beef-tea, wine-whey, or milk-punch, must also be given as soon as reaction commences, and be continued as the amount of stimulant is diminished, until it is made certain.

2. **Vomiting** is a very serious symptom after ovariotomy, and is considered here, since one of its forms may occur immediately after the operation. I have already spoken of it as very dangerous in cases complicated with adhesions, since it is liable to produce hæmorrhage from the surfaces whence they have been detached. It is also dangerous in every case if the clamp has been used, since thus traction is almost certainly made upon the uterus. It may also detach a ligature, not well applied, from the pedicle, and thus produce hæmorrhage; and, in case of coexisting peritonitis, may much exaggerate the patient's sufferings as well as increase her danger. In Mr. Wells's one hundred and third case an attack of vomiting occurred on the evening of the third day after the operation, which forced open the lower part of the wound, and a good deal of reddish serum escaped. The next morning he found a full inch of the wound open, but no intestine to be seen. He put in two hare-lip pins to prevent any further opening, but left the lower end of the wound open, to admit of the escape of serum. The patient subsequently became jaundiced and tympanitic, and died on the twenty-ninth day.[1] In his first

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[1] *Op. cit.*, p. 272.

case of a second ovariotomy, Mr. Wells found, on the evening of the third day after the operation, that, in a paroxysm of belching, "the lower part of the wound gave way, and a knuckle of intestine protruded, and a good deal of fetid serum escaped. He returned the intestine, reapplied three sutures deeply, and the patient did not seem to be worse. On the next day there was free fetid discharge from the lower part of the wound, and vomiting became troublesome." The tympanites increased, and the patient died on the seventh day.[1]

Vomiting may be produced:

1. By the anæsthetic used.
2. May be a symptom of incipient and advancing peritonitis.
3. May be produced by tympanites.
4. May result from simple irritability of the stomach in cases attended by great prostration.
5. From the too free use of opiates.
6. From too high a temperature of the apartment.

This symptom may often, therefore, be prevented by proper precautions. The anæsthetic should be some other than chloroform, since that most frequently produces vomiting (p. 384). At the present day large doses of opiates are not, as formerly, in vogue. In regard to the temperature of the patient, Dr. F. Bird found in his third case that, so long as nervous excitement was controlled and the activity of the skin was maintained, the patient did well. On the third day, therefore, since much fever and tenderness on pressure of the abdomen arose, he raised the temperature of the room from 75° to 85°, and in a short time these symptoms disappeared with free diaphoresis.[2] He attributed the increased febrile action to the "sudden cessation of large secretion, the amount of circulating fluid necessary for its support being thrown back on the system."[3] Such an elevation of temperature is, however, objectionable except in the condition just described. It must also be remembered that all of the blood contained in the vessels of the tumor, at the instant the pedicle is constricted, is removed with the tumor, and therefore does not "fall back upon the system" at all.

Dr. Clay admits (in 1864) that he has never found an efficient remedy for the gulping and vomiting, after ovariotomy, under the influence of chloroform: "A little patience, with a little gum-water, is, perhaps, the best remedy."[1] He would be glad to avoid chloroform altogether, since he was not so annoyed by this symptom before he used it; having had fourteen ovariotomies before anæsthetics had been introduced, of which nine recovered. Dr. Keith controlled the vomiting by the use of hot water; but, of late, he uses ether as an anæsthetic, and has no vomiting. Mr. I. B. Brown and Dr. Simpson give ice and carbonic acid for the chloroform-vomiting. If vomiting occur from the chloroform during the operation, Kœberlé advises to hurry on the chloroformization.[2] The latter stopped the chloroform-vomiting in his first case by sitting by his patient, and compressing her abdomen for two hours after the operation. The mere substitution of ether for the chloroform would have been a relief to both patient and physician.

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[1] *Op. cit.*, p. 322.

[2] *London Medical Gazette*, August, 1844, p. 657.

[3] Ibid., December 29, 1843.

As a symptom of peritonitis, vomiting is best controlled, at first, by an opiate, and especially by an hypodermic injection of the muriate of morphia—one-fourth to one-third of a grain every two hours, or oftener. Ice and iced drinks are usually tried in this, as in most other forms of vomiting. But the green vomiting of advanced peritonitis, of a low type, is usually irremediable, and indicates a rapid termination of the case. I, however, once succeeded, after various other means had been tried in vain, by the administration of ℥vj of infusion of ginger (ʒij to Oj), given at a single dose. The patient, however, died several days afterward, of exhaustion. Kœberlé finally succeeded, in a very obstinate case, by the administration, every fifteen minutes, of thirty drops of ether with gum-water. The oxalate of cerium, which is so much relied on to arrest vomiting in other conditions, proves of little avail in connection with either form of peritonitis.[3]

The eructations and vomiting dependent on tympanites do not usually come on till the fourth (or, perhaps, the third or the fifth) day. They may often be relieved by merely changing the position of the patient, by raising the shoulder, or in some other way, especially if depending upon a distention of the stomach merely; for gas will, of course, pass from the stomach into the small intestine, if the pylorus is the highest part of the stomach, as is the case if the patient lie on the left side. But, if this does not suffice, a sudden compression of the stomach, at the moment when the effort is made by the patient, may aid the stomach to relieve itself.[1] Of course, the removal of the tympanites is here to be aimed at, and will be subsequently considered.

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[1] "Obstetrical Transactions," vol. v., p. 62.

[2] "Opérations d'Ovariotomie," p. 23, note.

[3] Mr. Wells's case 10, p. 42.

Vomiting from great prostration is very difficult, and often impossible, to control. Iced champagne is, perhaps, the remedy most to be relied on. Vichy-water, with which a stimulant is mixed, will also sometimes succeed. A mild sinapism to the epigastrium may be found useful. A mixture of equal parts of chloric ether and aromatic spirits of ammonia (fʒj, well diluted, every half-hour) is also a valuable remedy. Hydrocyanic acid may also succeed. Meantime, the patient's strength must, if possible, be augmented by nutritive enemata.

It is sufficient to call attention to the fact that vomiting is sometimes produced by too high a temperature of the apartment, and by a too free administration of opiates.

3. **Hæmorrhage** may proceed, after the operation, from the pedicle or from surfaces whence adhesions have been detached. If from the pedicle, whether from a mere contraction of the latter, as in Mr. Solly's case, or from the slipping of a ligature, it generally occurs within the first twelve or twenty-four hours. But, of the two fatal cases from hæmorrhage out of Dr. Charles Clay's first one hundred and eight ovariotomies, one died thirty hours after the operation. Having a frightful dream, she suddenly started in her sleep, and thus slipped the ligature from the pedicle, and died immediately from internal hæmorrhage. In another of Dr. Clay's cases, hæmorrhage occurred on the second day after the operation, the ligature not having been applied tightly enough to the very thick pedicle. The incision was reopened, by the removal of the lowest three sutures, the pedicle was seized, and ligated again. A peritonitis very difficult to manage ensued, but the patient recovered, and a second ovariotomy was successfully performed on her, sixteen years afterward, by Dr. W. L. Atlee.[2]

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[1] Kœberlé, *loc. cit.*, p. 31.

[2] "Obstetrical Transactions," vol. v., p. 59.

Mr. Wells, finding that free bleeding had occurred, four hours after the operation, in his fortieth case, "at once reopened the wound, by removing hare-lip pins and sutures, grasped the uterus, and tied the bleeding surface in three portions. This quite stopped the bleeding. It had been very free, and, at one time, when the patient had fainted, I feared she was dead." The patient finally recovered, though the blood remaining in the pelvis afterward underwent decomposition, and symptoms of septicæmia ensued. On the fourteenth day after the operation, Mr. Wells made a puncture *per vaginam* into the Douglas *cul-de-sac*, and thus evacuated eight ounces of dark-colored fetid fluid, with immediate relief.[1]

Bleeding from the pedicle does not, however, always occur so promptly after the operation, even as the second day. In Kœberlé's fourth case, it occurred as late as the fourteenth day, and under the following circumstances:

At the operation, Kœberlé had applied his circular constrictor to the pedicle, and then passed a steel pin through it, above the clamp, as shown in Fig. 55. The pedicle being short, the abdominal walls formed a concavity around the pedicle, though there were no symptoms of traction of the uterus. The clamp was removed on the fourth day, and the stump of the pedicle neatly separated on the eleventh. A hæmorrhage occurred on the twelfth day, from an artery in the pedicle which opened in the concave cicatrix, and was arrested by the application of lint dipped in Pagliari's styptic, and a body bandage. The bleeding, however, returned with violence on the fourteenth day, and the hæmorrhage was arrested by Kœberlé as follows: "The lower infundibuliform portion of the cicatrix contained a coagulum, from the middle of which the arterial blood was welling up. I introduced into it the fingers of both hands, forcibly separated and tore the cicatrix, so as to make an opening of about four inches (ten centimetres). Then, making forcible compression with my left hand, which was very painfully felt by the patient in the course of the ovarian artery, I introduced two fingers of my right hand into the peritoneal cavity, and removed two large clots, besides smaller fragments. At the same time, I tore the pedicle from the abdominal wall, to which it was still in part fixed. Having cleansed the wound, and M. Elser keeping it open, I then seized the ovarian artery crosswise, in its deep situation, with a dressing-forceps, the blood meanwhile flowing abundantly, as soon as the strong pressure was removed. A severe pain was produced by the seizure of some nervous filaments of the ovary, the most powerful compression of the blades of the forceps being made, so as to produce an instant mortification of the tissues included. The pain and the hæmorrhage ceased at once. Some clots which still covered the intestinal convolutions were removed. But a considerably voluminous one, extending above the right groin toward the crest of the ilium, was left. . . . The edges of the wound were then allowed to close around the forceps, which dipped into the peritoneal cavity among the convolutions of the intestines, to a depth of two and a half inches (six centimetres), and dressings were applied. Chloroform was not given, both because the patient was very weak, and because of the vomiting it would possibly produce." The clot above mentioned as left, and being about the size of an egg, was absorbed in twenty days, so as to leave no traces appreciable by abdominal palpation. Kœberlé attributed the hæmorrhage to the too early removal of the compresses which had kept up a depression in the supra-pubic region, and believed that it would certainly have returned had he merely tied the artery, without detaching the pedicle from the abdominal wall.[1] The forceps came away in five days, and the patient recovered.

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[1] *Op. cit.*, p. 115.

Bleeding from the surface whence adhesions have been detached is rarely sufficient to cause death directly as mere hæmorrhage; but not seldom the small amount of blood poured out becomes decomposed and finally produces septicæmia. Bleeding from omental adhesions, which have not been sufficiently tied, may produce the same final result, of which one of my own cases, to be specified farther on, is an illustration. Dr. Clay, however, lost one patient in his first one hundred and eight cases, from the direct effects of hæmorrhage from the surface whence adhesions had been detached.

As rare, exceptional cases of hæmorrhage from still other sources, and in some instances fatal, I will mention the following: Dr. Keiller reports a case in the *Edinburgh Medical Journal* for December, 1865 (p. 574), in which the blood was supposed to come from a ruptured plexus of veins in the pelvis, though no *post-mortem* examination was made.[1] One of my own patients died four hours after the operation of hæmorrhage into the peritoneal cavity, the pedicle having been very carefully tied with a double ligature, and which was cut close to the knot. The *post mortem* showed that the blood came from a rupture in a venous plexus beyond the outer ligature, which must have been produced by mere traction upon it while tying the knot, though a careful examination, just before closing the incision, detected no bleeding.

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[1] "Opérations d'Ovariotomie," pp. 59–68.

Dr. G. W. Bayless, of Missouri, lost a patient in twenty and a half hours after the operation, of hæmorrhage from the abdominal incision. Two quarts of blood were found in the peritoneal cavity.[2] If the peritonæum had been included in the sutures, the result would probably have been different. I have myself had a case in which four ounces of blood were lost from the incision during the second night after the operation; but, as the peritonæum had been included in the sutures, it could not enter the peritoneal cavity, and no bad result ensued.

In Mr. Wells's eleventh case, very free hæmorrhage took place on the tenth day, from a small artery which had apparently been wounded in passing the lowest suture. He applied a ligature, and the bleeding ceased. In his thirty-eighth case also there was a little oozing of blood from one of the sutures in the night after the operation, and the following morning, but it ceased spontaneously.[3] In Mr. Bryant's seventh case, death occurred in twenty hours, from bleeding from "a false membrane covering the cyst." A pint of blood was found in the peritoneal cavity.[4]

Dr. W. L. Atlee's case, No. 214, bled freely on the ninth day after the operation, from the patulous extremity of the Fallopian tube, the clamp having been previously removed from the pedicle. As menstruation had commenced on the fourth day, he thinks the blood had accumulated in the uterus, and was then discharged on the patient's changing her position from back to side. The patient recovered.[1]

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[1] The blood came through the incision while the last suture was being introduced, and did not come from the pedicle (?), to which twisted wire had been applied.

[2] *St. Louis Medical and Surgical Journal*, March, 1853, pp. 204–208.

[3] *Op. cit.*, pp. 46, 113.

[4] "Obstetrical Transactions," vol. vi., p. 471.

The safeguards against the preceding causes of hæmorrhage, aside from the proper precautions during the operation, are perfect quiet of body and mind during the first few days after the operation, and veratrum viride, if the action of the heart become very strong. In case of apprehended bleeding from a denuded surface, a bag of ice, or an extra amount of compression, may be applied over the suspected surface. If profuse hæmorrhage actually occurs from the pedicle, the example of Dr. Clay and M. Kœberlé should be followed. If blood escape from a denuded surface in amount to endanger septicæmia, it must be removed from the abdominal cavity in the manner to be explained in connection with the treatment of the last-mentioned condition.

4. Kiwisch remarked that **peritonitis after ovariotomy** is almost always fatal. Nussbaum is of the same opinion, but he holds that, if no intestine is soiled or prolapsed, peritonitis is impossible. But we must distinguish between the acute and the asthenic form.

Acute inflammation of the peritonæum occurs in from twenty-four to ninety-six hours after the operation, its invasion being indicated by a rise of the pulse (100 to 120), and of temperature (101° to 103° or more), by tenderness of the abdomen on pressure, and more or less tympanitic distention. It is not, in a majority of the cases, ushered in by a chill. The high temperature, and the character of the pulse, are the most reliable signs. Patients not seldom recover from this form of peritonitis under appropriate treatment, it being scarcely more dangerous than idiopathic acute inflammation of the peritonæum. Dr. Charles Clay never resorts to bloodletting in its treatment, but has succeeded well in its management by the use of hot fomentations. Mr. I. B. Brown, on the other hand, has seen good effects from venesection in two or three cases. Of course, patients operated upon in full health tolerate bloodletting better than those who are not so, and may even require it. As soon as the tenderness of the abdominal walls is detected, opiate fomentations should be applied, and the veratrum viride be administered to lower the action of the heart. The question of leeching the abdomen, or of venesection, must be decided by a reference to the patient's general condition. If doubt remain, I should not consider the application of four to six leeches an injudicious measure, an opiate also to be given in quantity sufficient to remove the pain and all *malaise.* Kœberlé proposed to prevent peritoneal inflammation by the application, immediately after the operation, of a bag of ice on each side of the abdomen. This kept the parts beneath at a temperature of 64⅖° to 77° (Fahr.),[1] and was retained constantly, in his first case, for eleven days.[2] In subsequent cases, however, he diminished the time to from two to six days. In his fifth case, the pressure of the ice-bags, together with a considerable degree of tympanitic distention, produced congestion of the lungs, and a fatal hæmorrhage into the trachea and pleura occurred on the third day. In the sixth case, protracted paroxysms of coughing were apparently produced by them, and they were removed on the fourth day. The patient recovered, though the uterus and both ovaries had been removed. Afterward, in quite a number of his cases, the ice-bags remained only four or five hours, as a safeguard against hæmorrhage. Spiegelberg, almost alone of the German ovariotomists, applies warmth over the abdomen after ovariotomy, the rest using bladders of ice for the first four or five days. Grenser does not, however, indorse the latter practice.

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[1] *American Journal of Medical Sciences*, April, 1871, p. 398.

The rise in the temperature and the pulse, which occurs usually on the sixth day, from suppuration in the wound, if not healed by the first intention, must not be mistaken for symptoms of peritonitis.

The low or *asthenic form* of peritonitis occurs several days later than the preceding, usually not till from the ninth to the twelfth day. All its symptoms are less decidedly marked than those of the acute form, the tympanitic distention, and subsequently the vomiting, excepted. By the latter, a peculiar dark-green fluid is ejected, sometimes in mere eructations, and sometimes in large quantities, and but few patients recover who have this symptom in a decided degree. It is a principal object to relieve the tympanites, with the hope of thus relieving the vomiting, and indeed the surest means of preventing this form of peritonitis is the prevention of tympanites, or its prompt removal if it occurs during the first week. The remedies which have been suggested to arrest vomiting should here be tried, but some of the methods of removing tympanites also, as specified under the next head, must be applied.

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[1] 18° to 25° Centigrade.

[2] "Opérations d'Ovariotomie," pp. 48, 76.

In this connection I should allude to two other inflammations as sometimes ensuing after ovariotomy, viz., pneumonia and bronchitis. Decided congestion of the lungs is still less rare, and the treatment of these conditions should be conducted, if the patient be not anæmiated by the ovarian disease, or be still even plethoric, as it would be under ordinary circumstances. Stilling saved his eleventh case, having double pneumonia, by venesection. Mr. Wells's case, No. 50, had an oppression of the heart and lungs, and a pulse of 130 to 140, the next day after the operation. She had lost no blood at the operation, and was at once relieved by venesection to ℥x. The suffocating cough had previously caused a loss of ℥iv to ℥vj of blood from the pedicle, which the clamp did not properly control. A ligature was then applied. The patient recovered.[1] A violent bronchitis occurred in his sixty-second case, and which was promptly relieved by taking ℥viij of blood from the arm, and the patient recovered.[2]

5. **Tympanites.**—Some degree of tympanites usually occurs even in the simplest cases, on the second or third day after ovariotomy, in consequence of the diminished contractile force of the alimentary canal; and in such cases it subsides, in the course of two or three days, under the simplest treatment. In other cases, however, it is a most distressing condition, giving rise to extreme dyspnœa from compression of the lungs, to colic, eructations, and vomiting; and sometimes even determining a fatal result, by causing traction on the uterus in case the clamp be used, or, in any case, preventing the union of the incision, or reopening it if it had already united. But, so long as there is no obstruction to the passage of the gas through the alimentary canal, it will generally not be prevented by mere atony

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[1] *Op. cit.*, p. 139.

[2] *Op. cit.*, p. 160.

from being expelled *per anum*. Kœberlé specifies the following causes of retention of gas in the alimentary canal, and the consequent tympanites:

1. Atony of the intestines, especially of the rectum, surrounded as it is more or less by a pelvic peritonitis.
2. A spasmodic condition of the sphincter ani.
3. Obstructions of the canal from fecal accumulations.
4. Twisting of a convolution of small intestine.
5. Mechanical obstructions external to the alimentary canal.

As a preventive measure we should, therefore, replace the convolutions of the intestines before closing the incision, with the greatest care, to secure their normal relations. Dr. Clay aims to prevent tympanites also by the administration of ox-gall to keep up the peristaltic action of the intestines. Kœberlé administers the subnitrate of bismuth to absorb the gas in the alimentary canal, both before and after the operation. Tympanites being actually present, the dressings are first to be examined, and any undue pressure at any point, from compress or bandage, is to be relieved. Next the anus is to be dilated, either by a large and long tube, or by inserting two fingers for a few minutes; thus giving the gas an opportunity to escape. This being found insufficient, a full enema may be administered; and I have found no other more effectual than a quart of the infusion of the mentha viridis (one ounce to one pint of water). This both removes any fecal accumulation in the large intestines, and is at the same time a powerful stimulant to the muscular fibres of the digestive tube. If, however, the point of obstruction is too high to be overcome by any of the means already specified, and sometimes the accumulation of gas is confined merely to the stomach, or if tympanites depends on mere atony of the alimentary canal, five drops of the tincture of nux-vomica may be taken into the stomach every hour, or an equal dose of the tincture of capsicum. Tincture of mentha piperita, or the fluid extract of ginger, may perhaps succeed. The sulphate of quinine has also been found effectual, three grains *ter die*, by Mr. Hutchinson and Mr. Wells.

In Mr. Wells's case No. 83, great advantage was obtained in the removal of tympanites by faradization. The patient's left lung was completely compressed by the distended stomach.

Half a grain of extract of nux-vomica with half a drop of creosote was given in a pill three times daily; and Dr. Althaus employed faradization the first day for one-half hour. Mr. Wells quotes Dr. Althaus's account of the case as follows: "I saw her on May 18th, when the flatulent distention was so great that the left lung was almost entirely compressed, the heart being dislodged to the right, and there being tympanitic sound in the second intercostal space. I performed faradization, after which the patient had a considerable discharge of flatus. On May 19th I repeated the operation, and the patient then had two motions, one of them solid. I operated upon her four times more, after which the lung had again expanded to its normal volume, and, the patient being nearly well, I discontinued the treatment. Both Mr. Spencer Wells and Dr. Jenner, who had also seen the case, were of opinion that, if the patient had not been faradized, she would have died from the effects of meteorism." [1]

If all these means fail to relieve the tension and distress, Boinet and Kœberlé advise to puncture the intestine by a fine trocar. The former has several times done this without any disastrous consequences (p. 404); and Kœberlé attempted it in his seventh case, but found the intestine to glide at first from the point of the trocar. He afterward passed the trocar into the intestine through the lower part of the cicatrix—it being now the seventh day after the operation—but obtained more fluid than gas, and the patient died unrelieved four hours afterward.[2] In his ninth case the puncture succeeded, on the fourth day, in completely removing the gas, but too late, the patient dying very soon afterward (p. 130).

The cause of the obstruction in Kœberlé's seventh case was very remarkable. Having treated the pedicle by the extraperitoneal method, the tympanitic distention drew up the pedicle in such a way that the rectum was caught upon its upper edge, and raised so that the portion which merged above into the sigmoid flexure was abruptly flexed upon the lower portion at an angle of 30° to 35°, and no gas could pass beyond that point (p. 115). As a practical deduction from this state of things, he says: "To avoid hereafter this mechanical obstruction, I shall guard against fixing the broad ligament (pedicle) of the left side between the lips of the wound, unless it present a considerable length. If it be short, I shall take great care not to draw it forcibly outside."

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[1] *Op. cit.*, p. 166.

[2] "Opérations d'Ovariotomie," p. 114.

6. **Septicæmia** is accounted for by M. Kœberlé in the following manner:

> The putrefaction of the parts strangulated by ligatures occurs at the end of fifteen to twenty hours, and proceeds very rapidly under the influence of moisture, of the animal heat, and the air. The mortified and decomposed parts exhale an infectious odor. The sanies resulting is like that from the putrid flesh of a *cadaver*, and gives place to an active proliferation of cryptogama and microzoa. Its contact with the exposed tissues and the peritonæum rapidly produces formidable inflammation and septicæmia. Have we not here the explanation of the septicæmia and of the peritonitis which are developed and become general in the space of some hours, and which carry off the majority of those who die after ovariotomy? Peritonitis is rare when the pedicle can be kept outside of the abdomen, since then it dries up spontaneously, like the umbilical cord when not containing too much moisture. The perchloride of iron applied immediately after the operation is a safeguard against hæmorrhage, and mummifies the pedicle, and renders it imputrescent till it becomes adherent to the incision."[1]

But these statements need correction. M. Kœberlé assumes that every constricted pedicle undergoes putrefaction beyond the level of constriction, whether the latter be effected externally by a clamp or otherwise, or within the peritoneal cavity, by a ligature. He frequently speaks of the "mortified" stump, in case a ligature is applied. But it has been shown that no such mortification ensues, after the application of the ligature (p. 458). It is, in fact, only when the pedicle is kept outside the incision that the preceding statements respecting decomposition and sanies apply; and not even then, unless it be in a case treated as was the eighth of M. Kœberlé.[2] There being cystic disease of both ovaries in that case, he found it impossible to remove the whole mass on the left side (a polycyst), and a portion as large as the fist was left adhering to the recto-vaginal *cul-de-sac*. Around the upper part of this mass, a *serre-nœud*, with a metallic ligature, had been passed before the upper portion of the tumor had been cut away. Two other

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[1] *Op. cit.*, p. 27, note.

[2] Operation, July 16, 1863.

serre-nœuds, with metallic ligatures, had also previously been applied to the two pedicles. Five sutures were then applied to the upper part of the incision, after cleansing the peritoneal cavity, and the application of the perchloride of iron to the two stumps of the pedicles. Since the mass left in the pelvis was to undergo mortification, he left the lower part of the incision open, and placed a plate of lead four inches and four-fifths (twelve centimètres) long, and two inches and two-fifths (six centimètres) wide, folded like a gutter, across the upper angle of the incision, below the sutures, to retain the convolutions of the small intestines, which would have escaped between the three *serre-nœuds*. Six fenestrated rubber tubes, two-fifths of an inch (one centimètre) in diameter, were placed between the uterus and the leaden plate, all of them reaching to a depth of four inches and a half to four inches and four-fifths (eleven to twelve centimètres), so as to come into contact with the portion of the cyst left in the pelvis, and give free exit to the mortified detrita of the tissues. The uterus, much elongated by the cyst, having been adherent to it, presented in contact with the abdominal wall at the inferior angle of the wound; its fundus and posterior wall being directly exposed to the contact of the air and of the rubber tubes (p. 123). The leaden plate was retained till the fifteenth day, both it and the rubber tubes having been frequently removed in order to cleanse and disinfect them. During the first eight days, very regular peristaltic movements could be seen of the two convolutions of the small intestine, which lay, one above the other, across the upper angle of the incision still open below the sutures. The intestines as well as the uterus were alike uncovered and perfectly insensible to mechanical irritation. The patient had in them no sensation whatever. And, notwithstanding the prolonged contact of the tubes, the leaden plate, and the *serre-nœuds*, there was no symptom of metritis or intestinal irritation.

The disinfecting agent injected through the tubes was the sulphite of soda, one to ten of water by weight. Kœberlé also attaches a high value to the anti-putrescent and astringent properties of the sulphate and the perchloride of iron, as first applied by him to the pedicle. Four of the tubes only remained after the sixteenth day, and but one after the twenty-third, and, on the thirtieth, this was replaced by a tube only one-fifth of an inch in diameter. With this the patient returned to her home; and, four months after the operation, the incision had healed, though she was still in very feeble general health. Kœberlé remarks that "this case, very curious on account of the difficulties which had to be overcome to obtain a recovery, if not one of the most brilliant, is, when we consider the patient's infirm general health, one of the most remarkable examples of the resources of art and of Nature in the most difficult circumstances" (p. 125).

It is to cases like this that M. Kœberlé's account of the causation of septicæmia applies. And fortunate it is that nothing similar occurs in case the pedicle is kept *in situ* and the incision closed; since otherwise septicæmia must occur in every instance in which a ligature is applied to the pedicle; and which must in every instance prove fatal in the absence of treatment for the direct removal of the "mortified detrita" from the peritoneal cavity.

Leaving, then, the treatment of the pedicle out of the question, since the application of the perchloride or the persulphate of iron to the stump, with perfect cleanliness, should prevent septicæmia from that source, if the clamp be used—and there is nothing in the pedicle to produce septicæmia if the latter is left *in situ*—it will be found that septicæmia, after ovariotomy, is actually produced by the absorption into the blood, from the peritoneal cavity, of a decomposing fluid, it being either of the following:

1. It may be blood, oozing, after the operation is completed, from surfaces to which the ovarian tumor had been adherent, or from its pedicle.
2. Fluid from the tumor, which had been left by the operator in the peritoneal cavity.
3. Ascitic fluid, thus left or secreted after the operation, in cases of ascites complicated with ovarian tumor.
4. Pus, in the peritoneal cavity, produced while some surface is healing by granulation. Septicæmia produced in this way alone is true pyæmia.

I shall give examples of each of these varieties from my own experience.

Since the fluid in the peritoneal cavity, from whichsoever of the preceding sources derived, does not at once become decomposed, and since, moreover, the peritonæum itself absorbs but very slowly, as shown in my second following case, the symptoms of septicæmia are not developed under four to seven days (and, in one of my cases, on the eighteenth day) after the operation. I hardly think it possible that death should occur from septicæmia after ovariotomy in the space of thirty hours, as supposed in one of Mr. Wells's cases. Absorption may, however, occur more rapidly on a surface denuded of peritonæum, as by the detachment of adhesions; and septicæmia might thus occur more promptly, provided the fluid had also been very rapidly decomposed.[1]

Symptoms.—The symptoms of septicæmia are: loss of appetite; coated, dry, and then red, or dark, tongue; great debility not otherwise to be accounted for; rapid, small, and weak pulse; dry, hot skin; dizziness; a tendency to sleep, and a typhoid expression of countenance. Finally, the urine may become ammoniacal; there may be urticaria, or roseola, and mucous diarrhœa; and, at last, septicæmic pleurisy, or pneumonia. In some cases, also, an accumulation of fluid in the peritoneal cavity can be recognized by palpation; and a mawkish odor of the breath soon becomes apparent.

In all cases in which several of these symptoms appear, an examination *per vaginam* should be made, in order, if possible, to detect the presence of a decomposing fluid in the Douglas *cul-de-sac*, that it may be at once removed by one of the methods next to be described.

Many operators have regarded a patient as doomed who presents the symptoms just enumerated, and have therefore resorted merely to strengthening and stimulating her, and they have generally seen their expectations shortly verified. In a few cases, however, the patient has thus been sustained till the decomposed fluid found for itself an exit from the peritoneal cavity, either through the original incision, or *per vaginam*, from an ulceration through the recto-vaginal *cul-de-sac*. Dr. Keith, however, finding a commencing effusion into the peritoneal cavity with peritonitis, and some of the more marked symptoms above mentioned on the sixteenth day, punctured the Douglas *cul-de-sac* from the vagina, when a fetid fluid escaped, and all the grave symptoms subsided. He also, at an early date, made use of drainage-tubes. And Mr. T. S. Wells remarked, in 1864, that he had three times removed fetid fluid from the Douglas *cul-de-sac* as practised by Dr. Keith.[1]

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[1] A patient of Mr. H. Smith lived thirteen days with an opening into the bladder, large enough to admit two fingers, through which the urine flowed into the peritoneal cavity, and thence through the incision—commencing through the latter on the eighth day after the operation. During the first five days, blood flowed by the side of the pedicle. The opening in the bladder was doubtless produced by the detachment of an adhesion (*The Lancet*, November, 1863, p. 719).

Since Mr. Wells had returned the pedicle in these cases, he ascribed the accumulation of blood in the peritoneal cavity to a hæmorrhage from the Fallopian tube, such as sometimes occurs to a slight amount during the catamenial periods, from the cicatrix on the abdomen, after the pedicle has been treated by the clamp. I have already stated my objections to this theory (p. 459), and also add that it cannot account for the presence of a pint, or even three and one-half pints, of decomposed blood, as in Mr. Wells's fifty-ninth and one hundred and third cases.

I first proposed and practised **intra-peritoneal injections** in the treatment of septicæmia after ovariotomy, in February, 1855; and, as I consider them more valuable and effectual than any and all other methods, I shall give my experience in the use of them, extracting largely from an article, on this subject, in the *American Journal of Obstetrics and Diseases of Women and Children*, for August, 1870. And, since there has been much misunderstanding in regard to the precise conditions after ovariotomy which require intra-peritoneal injections, I shall rapidly sketch some of my own cases in illustration of this point.

CASE I. *Septicæmia from Decomposed Ascitic Fluid; cured by Intra-Peritoneal Injections.*—This was a case of ovarian tumor, complicated with ascites (a hundred and six pounds of ascitic fluid having been withdrawn by a previous tapping), and in which I performed ovariotomy in February, 1855.[2] Expecting that the immensely distended peritonæum would continue to secrete the ascitic fluid for a short time at least after the operation, I passed a gum-elastic catheter by the vagina, and behind the uterus, through a puncture, into the peritoneal cavity (the Douglas *cul-de-sac*), corked it tightly, and left it thus in order to be able at once to remove the ascitic fluid should it continue to be secreted.

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[1] "Obstetrical Transactions," vol. v., p. 62. His cases Nos. 36, 39, 59, 81, 101, and 103, may be consulted as illustrations of this method (*op. cit.*).

[2] Reported in *American Journal of Medical Sciences* for January, 1856.

The patient did well till the sixth day, when suddenly the symptoms of septicæmia appeared, and on removing the cork a small amount of very fetid fluid escaped. Feeling positive that a mixture of water with this fluid would be less mischievous than the latter in its concentrated form, I at once injected a quart of pure water at 98° (Fahr.) through the tube into the peritoneal cavity, and then allowed as much to flow back from the cavity; and, on repeating this quantity the second time, the patient remarked, "I feel refreshed, as if I had taken a bath," and again became bright and natural. The septicæmic symptoms would, however, return in eight to twelve hours, and the injections were repeated accordingly.

I inferred, however, from recollecting the chemical composition of the normal secretion of the peritonæum, that a solution of common salt in water would be preferable to pure water, and afterward used a solution of ʒj (to ʒij) to Oij water. As this solution also evidently acted directly as an antiseptic, it occurred to me that the liq. sodæ chlorinatæ might prove even more antiseptic, and I afterward used a solution ʒj to ʒij of it to Oj water, alternately with the salt-and-water. These solutions were repeated two or three times daily (as often as the symptoms returned) for seven days; when, there being no longer any odor of decomposition in the fluid obtained through the tube, the latter was withdrawn, and the patient recovered without any subsequent unfavorable symptom.

I soon found, also, that by bringing the external extremity of the catheter to a lower level than that in the peritoneal cavity, I could at once convert the tube into a siphon, through which all the fluid in the cavity would flow out. Two quarts of fluid were generally injected after the second day.

These results seemed to me to have demonstrated—

1. That a mixture of water or of salt-water (ʒj to Oj) with the fetid intra-peritoneal fluid is less mischievous than the latter alone.

2. That both salt-water and a solution of the liq. sodæ chlorinatæ (ʒj to Oj) are unirritating and decidedly antiseptic when applied to the peritonæum in the circumstances before specified.

3. That the peritoneal cavity may be evacuated of fluid, by a tube acting as a siphon.

4. That septicæmia may be removed by injections of the kind above mentioned, if it be not too profound or too far advanced. For no internal remedies were used in this case which are supposed to exert any special antiseptic influence.

CASE II. *Same Class as preceding; cured by Injections.*—In another similar case[1] (septicæmia from ascitic fluid), I at first used a warm aqueous solution of salt-and-albumen, in order still more nearly to imitate the natural secretion of the peritonæum.[1] But, finding that the albumen itself became decomposed by commixture with the fluid in the cavity, I returned to the salt-and-water and the liq. sodæ chlorinatæ. In this case I found it necessary to continue the injections twice daily, and then once daily—for *fifty-nine days* in all—when the fetor ceased and the patient recovered. The symptoms of septicæmia did not appear in this case till the eighteenth day.

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[1] Reported in *American Journal of Medical Sciences* for April, 1863.

CASE III. *Septicæmia from Two Sources; cured by Injections.*—This case occurred in September, 1863,[2] and was of a mixed character; septicæmia produced first by blood oozing from vessels of the omentum, and subsequently continued by pus formed on a granulating surface; both fluids becoming decomposed in the peritoneal cavity. The symptoms from the decomposed blood appeared on the fourth day, but were not decisive till the seventh, when the injections, as before mentioned, were commenced; and ʒj of the liq. sodæ chlorinatæ to ℥iv of water was sometimes used. The formation of pus persisting after all the blood was removed, it was found necessary to use the injections three times daily for twenty days, to keep the patient from sinking; then twice daily for twenty-one days, and once daily for thirty-three days more—making *one hundred and thirty-five injections, in all, in seventy-eight days.*[3]

I should add, for the encouragement of others, that I persevered in the use of the injections in the second case for four weeks, and in the last for three weeks, before the least improvement in the character of the fluid could be perceived. In these two cases I also administered the sulph. quinine (two grs. every four to six hours) and the liq. sodæ chlorinatæ (six drops, diluted, every four hours). The beneficial effect of these remedies was very remarkable; if discontinued for a few hours, the patient invariably got worse till they were again resumed.

CASE IV. *Septicæmia from Blood-clot. Injections, and Death on Seventeenth Day.*—Here was septicæmia from a decomposing clot of blood (probably about 4 oz. at first), from some small omental vessels, which did not bleed during the operation for the removal of the tumor, nor immediately afterward, though I delayed twenty minutes to close the incision to give an opportunity for oozing of blood. No symptoms indicated this slight internal hæmorrhage, and it was not till the twelfth day after the operation that septicæmia was declared; when the injections were commenced, as well as the sulph. quinine, and the liq. sodæ chlorinatæ internally. The injections always returned from the cavity, of the color of dark beef-broth with oil on the surface, though repeated three times a day; and on the seventeenth day the patient succumbed. The autopsy showed a decomposed clot, about three times the size of a hen's-egg, behind the omentum, i. e., between its posterior surface and the small intestines. The injections had disintegrated and removed this mass too slowly to save the patient. Had symptoms warranting them occurred several days earlier, the result might probably have been different. This case occurred in March, 1865.

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[1] The composition of this artificial serum is common salt ʒiv; albumen, ʒvi; water, Oiv.

[2] Reported in *American Journal of Medical Sciences* for July, 1864.

[3] The injection was omitted for four days out of the last ten of the seventy-eight.

Of the four patients mentioned thus far, three had unquestionably been rescued from death by the use of intra-peritoneal injections—a result which I believe no other agency could possibly have secured, and it was interesting to note how rapidly the blood threw off the septicæmic agent it already contained on removing the supply by the use of the injection; though, the fluid reaccumulating, the blood was again rapidly poisoned. I had, however, thus far, only *removed* septicæmia; and I now resolved in all my subsequent cases, if possible, to *prevent* it. This I proposed to do by leaving a tent in the lower end of the incision in every case of ovariotomy in which I could not feel quite positive that no blood, ascitic fluid, pus, or fluid from the ovarian tumor, could remain, or collect in the peritoneal cavity after the operation; the tent to remain undisturbed till the fourth day, if no symptoms occurred to demand an earlier withdrawal; when it was to be withdrawn and the cavity examined for the presence there of fluid—the examination to determine whether the opening should be finally closed or the injections be commenced.

I add three cases more to illustrate my subsequent practice and its results. I have not used the glass tube as first practised by Kœberlé, since I consider the use of any open tube to be an invitation to septicæmia:

CASE V. *Septicæmia apprehended, but no Fluid found in the Peritoneal Cavity; Recovery.*—In February, 1868, after removing a large fibrocystic tumor of the uterus, with very extensive adhesions, I thoroughly sponged out the peritoneal cavity as usual; but, fearing further hæmorrhage from the lacerated surfaces, I left a tent of moistened and firmly-twisted linen, three-eighths of an inch in diameter, and projecting a half inch into the peritoneal cavity, between the lowest two of the silver sutures which closed the incision. I then waited ninety-six hours for symptoms indicating the presence of blood in the peritoneal cavity. None appearing, I removed the tent, and passed a silver prostatic catheter through the opening to the bottom of the pelvis, where only the fluid would be found, if in very small quantity. The curve of this instrument is well adapted to this purpose, and I introduced it with the index-finger applied air-tight to its distal extremity; removing the finger when the beak reached the floor of the pelvis, to allow any fluid there to enter it; and reapplying it before removing the instrument, in order to retain in it the fluid, though there should be no more than a drop or two. Having withdrawn the instrument, the beak was placed on clean white paper, the finger again removed, and the color and other properties of the fluid were at once perceived as it flowed upon the paper.

This little manœuvre proved a very satisfactory test of the amount and the quality of the fluid in the peritoneal cavity. Only two or three drops of serum faintly tinged with blood, and of the natural odor, were obtained. The tent was, therefore, not again applied; the two sutures were finally adjusted; and the patient recovered without any unfavorable symptom.

CASE VI. *Threatened Septicæmia from Internal Hæmorrhage prevented by Intra-peritoneal Injections; Recovery.*—In November, 1869, I left a tent in the lower part of the incision after ovariotomy, as in the preceding case, having reason here also to expect hæmorrhage from the detachment of very vascular adhesions. In forty-eight hours after the operation the tent was seen to be saturated with blood, and on its removal about three gills of serum, deeply tinged with blood, issued from the peritoneal cavity, together with some gas, not fetid. Dr. G. W. Terriberry, of Paterson, New Jersey, was intrusted with the after-treatment of this case, under my direction, and he at once commenced the injections of salt-water with carbolic acid (gr. j to Oj), using them twice daily for twenty-nine days, and then once daily for fourteen days more.

It was an interesting feature of this case that the hæmorrhage continued, as indicated by the freshness of the blood discharged, *for thirteen days after the tent was first removed, and fifteen days after the operation.* On the ninth day, there evidently being a clot in the pelvis, I, remembering the termination of Case IV., advised Dr. Terriberry to break it up by the gum-elastic catheter used for the injections, which he did. Fresh blood and clots were discharged for six days more, when the former disappeared. The clots were, however, seen for a week more, when two or three large black coagula came away, and the fluid thereafter was purulent, and rapidly diminished in quantity, till it ceased entirely on the forty-third day.

Another point worthy of note in this case was the tendency to closure of the opening, rendering it necessary, after the third week, often to insert a sponge-tent. The patient was kept very low by the continued hæmorrhage, but rallied after it ceased, and slowly recovered. There was only the slightest odor of decomposition at any time, and at no time were there any symptoms of septicæmia.

CASE VII. *Septicæmia threatened from Colloid Contents of Ovarian Cyst, retained in the Peritoneal Cavity; prevented by Intra-peritoneal Injections.*—In June, 1870, I had reason to expect septicæmia from some portions still adhering to the peritonæum, in spite of thorough sponging, of the viscid colloid contents of a polycystic ovarian tumor I had removed; and I therefore inserted a tent between the lowest two sutures, as in the two preceding cases.

No unfavorable symptoms having arisen for ninety-six hours, the tent was then removed, when a quart at least flowed from the peritoneal cavity of a fluid of a light-brown color, and as offensive as can be imagined.

This being removed, so far as slight pressure could remove it, three quarts of warm salt-water (ʒj salt to Oj water) were injected, to which three grains of carbolic acid had been added; and this was repeated twice more, till the fluid returned without any odor of decomposition. This injection was repeated every afternoon for three weeks, four grains of carbolic acid to two pints of water being at length used; the fluid being pressed out of the peritoneal cavity every morning also at six o'clock, from the commencement of the third week. On the third day after the injections were commenced, about ℥viij of pure pus were obtained. This gradually diminished, amounting at the end of the third week to about ʒj in twenty-four hours, and on the fourth week the injections were used only twice (every fourth day); less than ʒj pus issuing daily.

At the end of six weeks the pus amounted from day to day to a mere trace, and the injections were discontinued. A little of the solution was squeezed from a sponge each day, so as to fall upon the opening and enter the peritoneal cavity, by Dr. A. G. Elliott, the attending physician; and the opening was closing rapidly. On the forty-seventh day the patient had driven out. She recovered, but died five months after the operation, of embolism of the left middle cerebral artery.

In this case a second opening was also made on the seventh day, at the upper end of the incision, by the pressure from within of the injection; so that the fluid injected through the lower opening directly into the pelvis filled the peritoneal cavity, and then issued in a full stream from the upper opening.

This accident was most fortunate for the patient, for, on the fourteenth day, while the fluid was issuing through the upper opening under high pressure (the mode of injection to be explained farther on), a false membrane, the result of a peritonitis before the operation of ovariotomy, and eight inches long by four inches wide, presented itself at the upper opening and was drawn out. The amount of pus was much diminished from this date. No symptoms of septicæmia presented themselves in this case, though the patient was a very delicate, much-debilitated, and highly-sensitive lady.

An interesting fact still remains to be mentioned. The opening at the lower extremity had not entirely closed, and still discharged a few drops of pus daily at the end of four and a half months. I then passed a gum-elastic catheter into the track taken by the pus and injected a small quantity of salt-water, and, on the second day thereafter, the ligatures which had been applied to the pedicle were thrown off. The daily manipulations and injections for several weeks had, doubtless, loosened them from the bed in which they had been at first isolated by the exudation, as has been explained on page 457.

RECAPITULATION.

Of the four cases of developed septicæmia, three were cured by intra-peritoneal injections, and one died. The internal remedies used doubtless sustained the first three patients, and to some extent also counteracted the septic influence; but, had not the decomposed fluid been removed, death must have occurred in all these cases.

Of the last two cases, in which septicæmia undoubtedly would have occurred had the injections not been used, they prevented it in both. Now, since experienced ovariotomists at present save somewhat above seventy per cent.[1] of their cases, and lose nearly thirty per cent.; and a fraction over one-sixth of the latter—i. e., five patients in one hundred, die from septicæmia—it follows if three-fourths of these may be saved by intra-peritoneal injections, even after septicæmia is established, that their use, *curatively* alone, will raise the average percentage of success from seventy to seventy-four and three-fourths per cent. And, on the other hand, if we consider that in most cases septicæmia may be entirely *prevented* by them, if seasonably used, we again come to the conclusion that their proper use should increase the average success of ovariotomy by at least four or five per cent.

How to apply Intra-peritoneal Injections.

At first I introduced a No. 10 gum-elastic catheter into the peritoneal cavity, and the fluid to be injected was carried through it by means of an accurately fitted ℥ viij hard-rubber syringe. All air is of course expelled from the syringe before it is inserted into the tube. But I have recently adopted a method which, it seems to me, answers every possible requirement, and affords every facility both for the patient and the surgeon.

The apparatus used is simply a No. 10 (or No. 12) gum-elastic catheter, and an India-rubber bag holding three quarts, with a tube attached to it four feet long and one-half inch in diameter, with a stop-cock three inches from its distal end.

This bag is filled with the fluid to be injected, in the following manner:

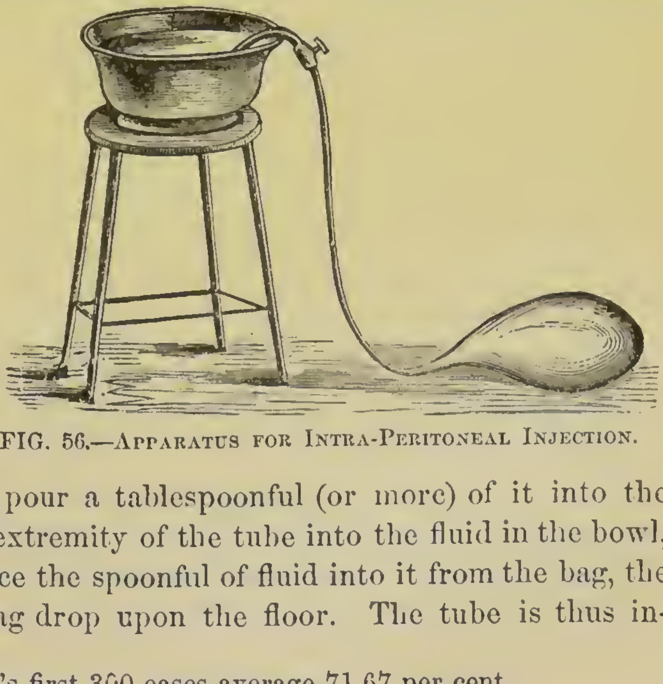

FIG. 56.—Apparatus for Intra-Peritoneal Injection.

Place a large bowl containing the fluid upon a table or other support, and pour a tablespoonful (or more) of it into the bag. Then drop the distal extremity of the tube into the fluid in the bowl, and by sudden pressure force the spoonful of fluid into it from the bag, the next instant letting the bag drop upon the floor. The tube is thus instantly converted into a siphon, through which the fluid flows at once, and until the bag is filled.

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[1] T. Spencer Wells's first 300 cases average 71.67 per cent.

Next the catheter is passed into the peritoneal cavity in any required direction; the tube is then attached to the catheter, and the fluid passed through the latter into the peritoneal cavity. Fig. 56 represents the bag in the process of filling.

By elevating the bag to different levels during the operation, the amount of pressure of the fluid can of course be graduated. When the peritoneal cavity is filled, the surplus of the fluid escapes by the side of the catheter, and the whole three quarts may be used at once, or not, as is required. On detaching the tube from the catheter and depressing the end of the latter, slight pressure upon the abdominal walls causes the fluid to flow through it; and, by keeping its outer extremity lower than its inner, it becomes a siphon, and thus entirely drains the peritoneal cavity. This process is repeated at each time until the fluid returns as clear and as devoid of odor as it was before entering the cavity; and very frequently nine quarts have been required to secure this result. As in this method there is no jarring or other disturbance of the catheter, the patient suffers very little inconvenience from the operation.[1]

After the latter is completed, from two to four ounces of the solution of salt and carbolic acid is left in the peritoneal cavity, and the tent is reinserted to prevent the opening from closing; or, if there be no danger of this, a compress is applied to absorb the fluid that may escape from the peritoneal cavity before the next injection.

The injections are repeated daily, or oftener, till the amount of decomposed fluid is reduced to ʒj or ʒss during the twenty-four hours, when it may be omitted for a day, the fluid being meantime pressed out, and the result noted. If no fluid accumulates, nor fetor returns, in forty-eight hours, the tent may be finally removed, and the opening allowed to close. It is safer, however, two or three days afterward, to pass a smaller catheter, and, turning the patient upon the side, or even upon the face, ascertain once more if there is any accumulation of fluid.

Mr. T. S. Wells spoke, in 1864, of intra-peritoneal injections as just described as an "extreme measure."[2] The answers to the following questions will show to what extent they should be so regarded:

1. Does the patient suffer pain from the contact of the injection with the peritonæum?—Never, unless the fluid injected is too warm or too cold (above 100° or below 94°). A motion of the catheter among the convolutions of the intestines some-

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[1] This method of injection is also applicable to the bladder, to the stomach in cases of poisoning, and to the pleural cavity after paracentesis for empyema.

[2] "Obstetrical Transactions," vol. vi., p. 62.

times gives a slight unpleasant sensation, which ceases, however, at once, on keeping it at rest.

2. Is there any danger from the admission of air into the peritoneal cavity?—I at first took great pains to prevent this, but both found it impossible to do so for several days in succession, and that its entrance is of no importance. It rises, of course, to the highest point in the peritoneal cavity, and slight pressure after the injection insures its escape through the opening before the tent is replaced.

3. Does the tent produce any symptoms from contact of its inner extremity with any portion of the alimentary canal?—None at all.

4. Is there danger of hernial protrusion during the use of the tent?—None. Patients have had violent vomiting without any such result.

5. Is the opening prompt to close after the tent is removed? Always in my cases. I therefore do not hesitate to use a tent for from two to four days after the operation of ovariotomy in *any* case, unless I feel very certain that no fluid will remain or will accumulate in the peritoneal cavity.

I should add that all the seven patients whose cases I have related were much below the average, as candidates for ovariotomy, in respect to strength and general health, with the exception of No. 5, who was in fair condition at the time of the operation.

The paper from which I have extracted the preceding cases concludes as follows:

> 1. Intra-peritoneal injections of water at 98°, with the addition of liq. sodæ chlorinatæ or carbolic acid, as before explained, are entirely safe after ovariotomy, in the conditions requiring them.
>
> 2. They should be used with a *curative* intention in all cases of septicæmia already developed, and in all cases for *prevention* where it is feared, from the presence already of a fluid in the peritoneal cavity, whose decomposition will produce it.
>
> 3. Thus used, they may reduce the percentage of deaths, from septicæmia after ovariotomy, from one-sixth of all who die after it, to one-thirty-sixth;[1] and increase the average success of ovariotomy four or five per cent.
>
> 4. Intra-peritoneal injections are never to be thought of except for the

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[1] Since they save five-sixths of the cases, or reduce the mortality from septicæmia to *one-sixth of the original proportion.*

purpose of removing a fluid already in the peritoneal cavity, which either already has, or assuredly will have, produced septicæmia.

5. A tent may be inserted for two to four days at the lower end of the incision, with entire safety, in any case of ovariotomy where the accumulation of such fluid is apprehended.

6. Finally, septicæmia would more rarely occur after ovariotomy if all fluid were removed from the peritoneal cavity by the most careful sponging before closing the incision.

Intra-peritoneal injections have been resorted to of late by several ovariotomists in this country with gratifying results. A part of the experience of Dr. W. W. Greene, of Portland, Maine, is recorded in the *Boston Medical and Surgical Journal* for March 7, 1871. Instead of using the tent, some have preferred to introduce a gum-elastic catheter *per vaginam* through a puncture into the Douglas *cul-de-sac* at the time of the operation, as I did in my first case. Of course, the injections should be also used through the tube, if it be found necessary to puncture *per vaginam* to remove a decomposing fluid, as in Mr. Wells's fifty-ninth and one hundred and third cases. I have known an intra-peritoneal injection to have been made in four instances in which nothing of the kind was called for. A good deal of pain and some shock ensued in two of the cases, which passed off in a few hours. In the other two cases no unpleasant effects resulted.

7. Of **exceptional conditions** after ovariotomy which require special management, I will speak only of diarrhœa, tetanus, femoral phlebitis, and the reopening of the wound after it has once united.

Diarrhœa occurs in some cases from mere anæmia and a consequent derangement of secretion. Kœberlé's fourth case is an instance; and bismuth and opiate enemata arrested it, and the patient recovered.[1] It is also a frequent accompaniment of septicæmia, and is then a grave symptom. The remedies just mentioned may arrest it, while efforts are made to remove the cause. It sometimes attends a suppuration with a bad odor around the sutures, or in their track after they have been removed; when a mild mercurial (as hydrarg. cum creta, or pil. hydrarg.) is generally indicated. In Kœberlé's third case, the diarrhœa continued from the tenth to the fifteenth

[1] "Opérations d'Ovariotomie," p. 63.

day, and was cured by bismuth, the sulphite of magnesia, and very nourishing food.[1]

Tetanus after ovariotomy has occurred in the practice of M. Boinet, Nélaton, Prof. Humphrey, of Cambridge, England, and Mr. T. S. Wells. It occurred to Boinet's patient on the eighth day, and Prof. Humphrey's died twelve days after the operation.[2] Nélaton's patient died suddenly of tetanus on the twenty-first day, after having apparently recovered from ovariotomy; giving rise to the remark of M. Dechambre, editor of the *Gazette Hebdomadaire*, that M. Nélaton's patient died cured.

In Mr. Wells's ninth case[3] the symptoms of tetanus were first noticed on the fifteenth, and became decided on the seventeenth day. He applied to the suppurating portion of the pedicle, fl ʒ ss of a solution of woorara (grs. ij to distilled water fl ℥ j). The patient, however, got worse, and in the evening a subcutaneous injection of twenty minims of the solution, containing one-twelfth of a grain of woorara, was made near the angle of the left jaw. An alarming convulsive attack ensued, and the pulse and respiration both stopped for several seconds, but the intensity of the symptoms diminished as soon as the attack was over, and the next day the patient could open the mouth, though some stiffness of the muscles remained for a week. The wound had healed on the nineteenth day, and all the tetanic symptoms had disappeared. Tetanus also occurred in his twelfth and thirty-fifth cases, and proved fatal on the tenth and the fourteenth day. Turpentine-enemata, asafœtida, chloroform, and woorara—even half a grain, hypodermically—had been tried in vain.

Femoral phlebitis (phlegmasia alba dolens) occurred in two or three instances to Dr. W. W. Greene, after he had brought the ligatures of the pedicle through the Douglas *cul-de-sac* into the vagina. He was inclined to accuse this method of treating the pedicle as causing the phlebitis, and therefore discontinued it. This complication has, however, occurred in cases in which the ligatures did not pass out *per vaginam*. In Mr. Walne's second case, it occurred decidedly on the left side, whence the tumor had been removed, and also slightly on the right side, the ends of the ligatures having been brought out through the incision.[1] Dr. S. H. Tewksbury, of Portland, Maine, has, on the other hand, several times operated in the way now rejected by Dr. Greene, without producing phlebitis. In my own case thus treated, in 1855 (p. 510), no phlebitis followed. I think the inflammation begins in the plexus pampiniformis, and extends downward as it does after parturition, being produced by the constriction applied near the plexus to the pedicle; and that the disposal of the ends of the ligatures has nothing to do in its causation. It is to be treated as when it occurs after parturition.

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[1] "Opérations d'Ovariotomie," p. 47.

[2] Boinet, p. 403.

[3] *Op. cit.*, p. 38.

A reopening of the wound and suppuration around the points of suture, on the sixth to the eighth day, or later, indicates a low assimilative and recuperative power, and is a bad symptom. This was first noticed as occurring in Mr. Walne's fourth case, which terminated fatally.[2] I have lost two cases on the fifteenth and the seventeenth day after the operation, in this condition. The best nourishment with stimulants, and tonics, is indicated. Extensive sloughing of the wound also sometimes occurs. In Mr. Wells's twenty-second case, the wound which some days before began to look unhealthy at the lower part, though apparently well united at the upper part, began three weeks after the operation to slough, and there was a rigor, with rapid pulse, and some abdominal pain. The condition of the wound became worse, and the upper portion reopened, and was covered with a firmly-adherent slough. The tongue was black, and the pulse very rapid. "Strong nitric acid was applied to the wound, and the patient was soon after removed some miles inland from Liverpool, where the operation had been performed. She rapidly recovered after removal. Mr. Bickersteth, of Liverpool, had had similar trouble with many wounds about that time, both in public and private practice.[3] In his forty-first case, large shreds of areolar tissue were removed from between the lips of the wound on the fifth and sixth days; which, since the general condition was satisfactory, was explained by the fact that there were two patients with sloughing sores in an adjoining ward.[4] The patient recovered. Sometimes abscesses are formed in the track of the incision or near it in the abdominal walls; the matter of which must be at once evacuated, lest it enter the peritoneal cavity. Mr. Fergusson lost his first patient operated on in King's College Hospital, from the bursting of an abscess into the peritoneal cavity, on the sixteenth day.[1]

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[1] *London Medical Gazette*, August 11, 1843, p. 703.

[2] Ibid., March 1, 1844.

[3] *Op. cit.*, p. 76.

[4] *Op. cit.*, p. 120.

Cases like the following are of very rare occurrence:

Nussbaum, in his sixteenth case, removed the sutures on the twelfth day; no union had taken place, and the abdominal wound was still wide open, bringing into view the bladder and uterus. The intestine was attached to the diaphragm in one mass. The patient lived thus forty-six days.[2] He also speaks of his twenty-eighth case thus: "No urine, no perspiration, all the organs dry and apparently functionless, heart and lungs but little moving. Death on the fourth day."

Bühring, of Berlin, mentions a case in which, on the third day, the margin of the wound looked dry and unchanged, as if the incision had been made into leather.

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[1] *The Lancet*, 1864, vol. ii., p. 416.

[2] Grenser, p. 58.

LEEDS SCHOOL OF MEDICINE

CHAPTER IX.

THE HYGIENIC CONDITION OF THOSE WHO SURVIVE OVARIOTOMY; POST-MORTEM APPEARANCES IN FATAL CASES.

SECTION I.

THE HYGIENIC CONDITION OF THOSE WHO SURVIVE OVARIOTOMY.

It may be stated, in general, respecting those who have had but one ovary removed, that, after they have recovered from the operation itself, and the more or less prostrated condition in which they were previously to it, they are restored to as perfect general health as they presumably would have enjoyed had they never been affected at all by the ovarian disease. And the rapidity of convalescence is, as we have seen, sometimes astonishing. If, however, anæmia and great debility had existed for several months before the operation, a longer time after it may be required for a complete recovery, as might be expected. The testimony of all experienced ovariotomists is uniform on this point. Of the forty patients saved of his first fifty-one cases by Dr. Keith, "all got well at once, except one who required a year to recover perfectly."

Mr. T. S. Wells remarked, on a review of this subject, in November, 1866:

> The rule is that, by a successful ovariotomy, the patient is restored to a state of health so perfect that she and her friends are as surprised as they are gratified. But there are exceptions to this rule. In some cases a disease believed to be innocent proves to be malignant, soon recurs, and proves fatal within a few months, or even within a few weeks, after apparent recovery. In other cases, the ovary which is left untouched, because it is believed to be healthy, or so slightly diseased that its removal is uncalled for, becomes the seat of disease. In what proportion of cases this occurs, we have as yet no means of knowing. It is only within the last ten years that the operation has been performed sufficiently often to furnish

data for reliable statistics, and it is difficult to ascertain, even in some of these later cases, what has been the state of the patient's health for some years after operation. But it would be unreasonable to expect that in all cases the ovary left in the body would remain healthy. It is for future observation to decide how often, and in what class of cases, a recurrence of disease may be feared. It is satisfactory, however, to learn that, if the remaining ovary should become diseased, the first operation need not add much to the difficulty of the second, and that, of four cases in which a second ovariotomy has been performed, two have proved successful.[1]

1. But we have here to consider more especially the effects of ovariotomy upon the reproductive function; and, first, the cases in which but one ovary is removed. Spaying one of the lower animals on one side has been found to diminish the fecundity to less even than one-half its original force. John Hunter found that a sow thus mutilated farrowed six less than one-half as many as another animal of the same age with both ovaries remaining entire.[2]

Doubtless the reproductive capacity of woman is also diminished, and perhaps to a similar extent, by the removal of a single ovary. Women, however, who naturally had but a single ovary, have given birth to children of both sexes;[3] and the same is true of the class of women now under consideration. The patient on whom Mr. Jeaffreson performed ovariotomy by the short incision, in 1836 (p. 277), afterward gave birth to four children, and of both sexes. Mr. Wells had, in 1867, already had ten patients who had given birth to children after ovariotomy. Sir William Fergusson's patient, in her second confinement after ovariotomy, gave birth to twins; both children being, in this instance, included in the same membrane.[4] The birth of twins, in such a case, demonstrates that two ova may be matured at the same time by a single ovary. But this must also happen in all cases of triplets, unless—which is still less probable—all three of the ova come from one of the ovaries.

Menstruation after the loss of a single ovary is as regular as before, though sometimes diminished in amount and duration. We have already seen that it sometimes occurs for several months after ovariotomy, in cases in which the clamp has been used, through the Fallopian tube of the side operated on, and upon the surface of the abdomen. Prof. Kehrer, of Giessen, thinks this is not a physiological flow;[1] but, since it occurs simultaneously with the periodical flow *per uterum et vaginam*, I know not what else to term it. Some of the blood naturally proceeding from the Fallopian tube takes a retrograde course, instead of flowing entirely into the uterus, as in the normal condition.

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[1] "Medico-Chirurgical Transactions," vol. l., p. 12, 13.

[2] "On the Animal Economy." [3] Kiwisch, p. 47. [4] *The Lancet*, 1867, p. 48.

2. A still more interesting inquiry is, What is the effect of the removal of both ovaries upon the general condition as well as the reproductive function?

It was long since observed that even young female birds, in which the ovaries have become shrivelled, undergo an entire change in external appearance, their plumage resembling that of the male. Such birds are termed mules. It has also been asserted that women, from whom both ovaries have been removed, undergo a decided physical change, they becoming thin, their features more masculine, the voice harsh, the breasts atrophied, and sometimes a well-developed beard resulting from the operation. In Mr. Pott's case, already cited (p. 227), the first-mentioned two of the preceding changes occurred; in a case reported by Dr. A. Reeves Jackson,[2] "the voice became harsher and more masculine, but otherwise no change was discernible;" and Dr. W. L. Atlee found one of his patients, after double ovariotomy, with a "shaved beard."[3] This was, however, fourteen years after the operation, and the change probably occurred during the previous three years, the patient passing from forty-seven to fifty years of age; since Dr. Atlee makes no mention of the change as having occurred when he visited her at the age of forty-seven. I have seen a well-developed beard in three instances in women who had cystic disease of the ovary, and should accept such a fact as a ground of suspicion that both ovaries are affected. In all these cases the tumors had developed slowly; but I have been unable to trace their subsequent history.

But, on the other hand, it should be stated that the same changes which have been mentioned above have been observed in women, especially when somewhat advanced in life, who have never been suspected of ovarian disease of any form.

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[1] *American Journal of Obstetrics*, May, 1870, p. 177.

[2] *Chicago Medical Journal*, October, 1870, p. 585.

[3] Ibid.

The cases I have just detailed must also be regarded as exceptional. In three of my first six cases, both ovaries were removed, and neither of the patients has lost any of her feminine attributes up to the present time, so far as indicated by external appearances. The time which has elapsed since the three operations is twenty-one, sixteen, and nine years. I have since had six successful cases of double ovariotomy, in neither of which has any change in the physical appearance occurred; but the time with these has been only from six to two years. Nor do Dr. Clay and Mr. Wells, with their extensive experience, mention any instances of the occurrence of such changes. In respect to the voice acquiring a masculine quality, Mr. Wells quotes his patient, on whom he performed a second ovariotomy, eighteen and a half months after a previous one, as writing to him, between three and four months after the second operation, as follows: "I think upon the whole I feel as well as I did after my first operation. My voice is stronger. I can sing the upper notes with greater facility than formerly. I can sing from A up to C natural." This testimony is entirely reliable, as the patient was a teacher of singing.[1]

It cannot therefore be stated, as a general proposition, that the removal of the ovaries produces a change in the physical organization of woman, so as to make her more masculine in appearance, voice, and form; though such changes sometimes follow double ovariotomy, as well as attend the progress of ovarian disease in cases not submitted to that operation; but they also occur independently of any suspected ovarian lesion.

Admitting for the moment that it is the influence of the ovaries which mainly determines the feminine attributes of woman, it should really make no difference whether both ovaries have been successfully removed, or are merely no longer capable of performing the functions of ovaries on account of disease; and we should as certainly see the changes above specified, in case of prolonged disease, involving the entire structure of both ovaries, as in the class of patients under consideration. But if this supposition be correct, it certainly requires a considerable length of time after the entire cessation of ovarian influence, whether from disease or from extirpation, before the effects of its withdrawal become apparent—twenty-two years sometimes not being long enough (as in my first case) to show any commencement of such changes. Still, I am inclined to adopt the above hypothesis, in a general way, from the want of a better up to the present time.

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[1] "Medico-Chirurgical Transactions," vol. l., p. 8.

3. Finally, the alleged cases of menstruation after the removal of both ovaries demand examination. And the following well-authenticated cases of apparent catamenial discharge may be quoted:

In my first case of double ovariotomy, in September, 1850, a sanguineous flow occurred *per vaginam* on the third day, and continued for three days.[1] A similar flow has since occurred in three other successful cases, continuing from one to four days. Dr. W. W. Greene reports four such cases, the flow in one instance returning a second time.[2] Dr. A. Reeves Jackson, of Chicago, Illinois, reports a case,[3] operated on by himself, August, 31, 1865, the patient being forty-four years old. Her regular monthly period had ceased the day before the operation. A flow *per vaginam* recurred thirty-one days afterward, and continued four days, with the usual symptoms of lassitude, nervousness, and back-ache. It again appeared after an interval of eighty-three days; and after this time it recurred with perfect regularity every twenty-eight or twenty-nine days for twenty-two months, accompanied by all the ordinary symptoms of menstruation, and lasting each time from three to five days. It then ceased for four months, to reappear for the last time; the patient being now forty-seven years of age. During all this time the patient's general health was excellent; and Dr. Jackson satisfied himself that there was no disease of the uterus or vagina. He communicated the principal features of this case to Dr. W. L. Atlee, Mr. Wells, Dr. Charles Clay, Mr. I. Baker Brown, Dr. H. R. Storer, and others, and was surprised to find that they had each met with similar ones, some of which he reported in the *Chicago Medical Journal* for October, 1870, p. 585–587, as follows:

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[1] *American Journal of Medical Sciences*, April, 1851, p. 385,

[2] *Boston Medical and Surgical Journal*, March 2, 1871.

[3] *American Journal of Medical Sciences*, July, 1866, p. 111.

Case I. (Dr. W. L. Atlee.)—Mrs. J. C., aged thirty-six years, mother of six children. Menstruation always returned five months after parturition. Menstruated regularly the last time, March 20, 1854.

April 17, 1854, both ovaries were removed at eleven o'clock A. M. Menstruation returned the same evening.

On the anniversary of the operation for several years Mrs. C. regularly wrote to me, keeping me advised of her condition, always assuring me that the menses continued to return regularly.

December 5, 1867, I saw the patient. She informed me that up to May 1, 1864, she continued to menstruate as regularly as she had ever done. It then ceased. In May, 1865, she had a return, which was the last of it. December 3, 1866, she was forty-eight years old.

August 1, 1868, I called to see her while passing through B——, and noticed that she had a shaved beard.

Case II. (Dr. W. L. Atlee.)—Miss K. V., aged nineteen years, has menstruated regularly, accompanied with some dysmenorrhœa. Had a regular menstruation just four weeks ago. April 25, 1855, removed both ovaries.

October 25, 1855, I saw the patient. She had just issued her wedding-cards. She has had the regular monthly molimen as before the operation, and also a monthly discharge, but not stained with blood.

She married, made a visit to Europe, and after her return I learned from her mother that the monthly discharge continued, and that she had the proper enjoyments of matrimonial life.

Case III. (Dr. H. R. Storer.[1])—Sarah A. Colcord, aged forty-seven, unmarried. The menses have always been normal, though somewhat scanty. September 23, 1865, both ovaries and the whole of the uterus, except a small portion of the cervix, were removed.

From the date of the operation until October 11th, eighteen days subsequently [to it], and twenty-six after the last appearance of the catamenia, there was no discharge whatever from the vagina. Then there occurred a sanguineous effusion, attended by feelings of lassitude, back-ache, etc., etc., lasting thirty hours, and being an evident attempt at the reëstablishment of menstruation.

Case IV. (Dr. H. R. Storer.[2])—Mrs. Dunham, aged forty-three years, the mother of six children. Menstruation had been regular down to within two months, and was now suppressed, as was supposed, by pregnancy. The symptoms became urgent, and November 20, 1867, both ovaries were removed. "In the present instance, the menses had been absent for two months, and yet reappeared subsequently to the operation, although the ovaries had both been removed, and the major part of the Fallopian tubes also."

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[1] *American Journal of Medical Sciences*, January, 1866, p. 110.

[2] *Canada Medical Journal*, 1868.

Case V. (Dr. H. R. Storer.[1])—Mrs. Mathews. The ovaries were entirely removed, and yet the patient has had, quite regularly, a sanguineous discharge, without evidence of uterine disease, and which hæmostatics, generally and locally applied, have failed to check or prevent.

Case VI. (I. Baker Brown).—A little more than two years ago I operated on a young lady extremely reduced by ovarian (multilocular) dropsy, and removed both ovaries; and yet she has ever since menstruated, but not regularly—sometimes missing a few weeks.

Case VII. (I. Baker Brown.)—The case on which I lay most stress was one on which I operated ten years ago. I used the clamp externally, and the stump of the pedicle adhered to the parietes. At every subsequent epoch the skin broke, and she menstruated through the stump, and some through the vagina.

Le Fort also reports a case, similar to that of Miss T., in the *Gazette Hebdomadaire.*

Kœberlé records a case of this kind also, in which not only the ovaries, but a large portion of the uterus, were removed, without interfering with the menstrual flux.[2]

Unquestionably, therefore, a sanguineous flow occurs *per vaginam*, in exceptional cases, after double ovariotomy; this obtaining only once or several times, at regular or irregular intervals; and very soon, or a considerable length of time, after the operation. But can such a flow be appropriately termed menstruation?

Dr. Charles Clay, of Manchester, England, wrote Dr. Jackson (April 24, 1869) that, in about two hundred and twenty cases of ovariotomy, he has performed double ovariotomy four times; and that in three of these he had noticed subsequent sanguineous discharge, which, however, he had never considered as menstrual, but attributed it to congestion of the lining membrane of the uterus.[3]

If, for the moment, we set aside all the generally-received ideas of menstruation as depending on ovulation, I suppose no one would accept as menstruation the flow which occurs but once, and in the first week after the operation, or indeed at any point of time thereafter. Such a hæmorrhage is a mere uterine epistaxis, or metrostaxis, as Mr. Wells has appropriately named it; and may arise from the body of the uterus alone, or the cervical canal, or both at the same time.

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[1] *American Journal of Medical Sciences*, January, 1868.

[2] Liegois on the "Function of Reproduction," being Part First of his "Traité de Physiologie appliquée à la Médecine et à la Chirurgie," Paris, 1869.

[3] *Chicago Medical Journal*, October, 1870, p. 587.

The only cases which can, with any reason, be accepted as instances of menstruation, are those in which the flow returns repeatedly, and with more or less regularity; as in the case of Dr. Jackson, the two cases of Dr. W. L. Atlee, the third of Dr. Storer's cases; and the case of Le Fort and of Kœberlé. Since Mr. Brown speaks in his last case (No. 7) of *the* pedicle adhering to the parietes, I infer that but one ovary had been removed.

Thus we have in literature six cases of apparent menstruation after double ovariotomy. Is it really such?

If we define menstruation to be the sanguineous flow which is produced by ovulation, or which merely accompanies ovulation, of course the term is here inapplicable; since, in the absence of the ovaries ovulation is impossible. But, there is no proof, nor any probability, that ovulation produces true menstruation. Certainly, ovulation, and even parturition, occurs in some women who have never menstruated. Menstruation is, therefore, an accidental and an incidental rather than an essential function; and it has no analogue in most of the lower animals. In itself considered, it is merely a flow of blood at stated periods, from the interior of the uterus, irrespective of its connections or causation. But, in its scientific acceptation, it has always been restricted to the flow from the cavity of the uterus and the Fallopian tubes, which returns once a month to a healthy, non-pregnant woman of the child-bearing age. More recently, it has been found also that ovulation occurs especially, but not exclusively, at the same time; and physiologists are therefore obliged to associate this idea also with menstruation, as the before-mentioned characteristics always have been. And we must have some term to express precisely these ideas, and no more nor less. We must therefore cease to use the term in this sense, and substitute another, or retain it in this sense alone. In other words, if an exceptional uterine flow in circumstances such that ovulation is impossible be called menstruation, the same term must not be applied to the flow which physiologically accompanies ovulation. No one, I suppose, proposes to relinquish the term in the latter circumstances; it must, therefore, not be applied in the former, but a new term must be used, and metrostaxis is unobjectionable. Metrostaxis may occur at any time, and does occur under very diverse circumstances, from any part of the uterine cavity or the cervical canal, in a congested state of the internal vessels of the non-pregnant uterus; and may occur from the cervical canal alone even during pregnancy, or, after the removal of the ovaries and all of the uterus except the cervix, as in Kœberlé's case. The flow may also, though very rarely, become quite regular, as we have just seen in cases in which both ovaries have been removed. But all this is mere metrostaxis, and not menstruation, and cannot be cited to disprove any theory of the causation of true menstruation. And no such theory, therefore, need here be discussed.

Thus, double ovariotomy, as a rule, is not followed by any loss of the special characteristics of woman; the only decided physiological change being a final cessation of menstruation as well as of ovulation. Three of my own patients, married and highly-educated ladies, after recovery again became splendid examples of womanhood, enjoying the most perfect health, and retaining all their former attributes of mind as well as of body, and with undiminished sensory capacities in their matrimonial relations.

SECTION II.

POST-MORTEM APPEARANCES IN FATAL CASES OF OVARIOTOMY.

Immense tympanitic distention not seldom causes the incision to reopen, as is seen by mere inspection, the convolutions of intestine presenting at the opening. And, in such circumstances, the latter will almost always be found agglutinated by a peritonitic exudation. This occurred in Mr. Wells's tenth case, and in my own seventeenth case. Unexpected obstructions are also sometimes the result of such disturbance, as in Kœberlé's ninth case.

Inasmuch as it is desirable to inspect the internal surface of the incision, and its immediate surroundings, the incisions made for the autopsy should be such as to allow the whole anterior wall of the abdomen to be raised, like an apron, or to be turned down from above. In the latter case, a vertical incision may be made from the junction of the eighth rib with its cartilage, down to the crest of the ilium, on each side, and thence along Poupart's ligament for four or five inches; and the upper ends of the vertical incisions be connected by an arched one extending across the epigastrium. In case the parietes are to be raised from below, the incisions from the crests of the ilia are prolonged to the symphysis pubis, and the last-mentioned transverse one is, of course, omitted.

On attempting to raise the abdominal wall, when divided as just explained, it is sometimes found to be adherent to the omentum throughout the length of the latter. Indeed, this is always to be expected in case the wound has reopened before death, or has not been closed at all, as in Nussbaum's case; and in this way the air and pus, if the latter be poured out in the course of the incision, are entirely prevented from entering the peritoneal cavity. This occurred in Mr. Wells's fifty-ninth case.

On raising the abdominal wall, it is found, if the sutures closing the incision included the peritonæum, that, by the end of twenty-four hours after the operation, they cannot be seen at all on the peritoneal aspect of the wound, since the two surfaces of peritonæum which have been brought into contact have united by first intention, and an exudation has also been poured out into the narrow groove formed by their divergence. Thus, if any pus is formed by the side of the sutures, it cannot enter the peritoneal cavity. If, on the other hand, the sutures did not include the peritonæum, they can be seen on the peritoneal surface of the wound, and pus or blood in their track may fall directly into the peritoneal cavity. Mr. Wells's cases Nos. 4, 6, and 18, illustrate these points.

The appearances of the interior of the abdominal cavity, after fatal cases of ovariotomy, are usually not peculiar, except so far as the incision and the pedicle, and their immediate surroundings, and the surface whence adhesions have been detached, are concerned:

1. If death has occurred from *peritonitis*, whether acute or asthenic, the usual signs of these conditions are found. It is also generally seen to commence in and around the incision, and, less frequently, from the pedicle; while inflammation is

very seldom seen on the surface whence adhesions have been detached. It often occurs that, while the intestinal convolutions are extensively agglutinated together, and the parietal or pelvic peritonæum is inflamed, the surfaces just mentioned are found to have been rapidly healing. This was exemplified by Mr. Wells's eighteenth case. In his fourteenth case (died in twenty-three hours), there was peritonitis around the wound, on the intestines in contact with it, and on the broad ligament, but none in the track of the ligatures left coming out of the wound. There was between one and two pints of bloody serum in the peritoneal cavity, but no clot.[1]

The fluid found in the pelvic cavity, in case of death from peritonitis, will, of course, vary in appearance, according as it is, or is not, mixed with blood, or ascitic or cystic fluid, or is the product of an acute or of a low grade of inflammation. In quantity it may vary from a few drachms to two or three quarts. It is a fact of much interest that the peritonitic exudation is sometimes of a very acrid character. In Mr. Wells's fourth case (died of peritonitis in thirty-two hours), it had a pungent, irritant effect upon the skin beneath the edges of the nails and surrounding their matrices—the hands having been immersed in it while the cadaver was yet warm.[2] In his twenty-fourth case (died of collapse in twenty-four hours), he remarks the effused reddish serum—of which there were four to five pints in the peritoneal cavity—"must have been a very active animal poison, for I suffered very severely two days after the examination from a very slight scratch with the point of a needle on the left forefinger. I sucked the spot instantly, but the next day a small vesicle formed, and I applied caustic freely. On the second day, I had severe rigors, lasting several hours, with intense headache, relieved by vomiting and a copious perspiration, which lasted about eighteen hours. For several days afterward, I was very weak, but all the severe symptoms had passed off by the fifth day after the puncture."[3] In one of Mr. Wells's cases, in which death occurred in forty-four hours, from diffuse peritonitis, some bloody serum was found in the sub-peritoneal tissue of the uterus and the remaining ovary.[4]

2. In case of death from *septicæmia*, more or less fetid fluid

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[1] *Op. cit.*, p. 55. [2] Ibid., p. 14. [3] *Op. cit.*, p. 79. [4] Case 54, p. 142.

is found in the pelvic cavity. In one of Mr. Wells's cases about forty ounces of dark-red serum and two ounces of blood-clot were found in the peritoneal cavity. Sometimes the decomposing fluid is contained in a distinct cavity, separated from the rest of the peritoneal cavity, viz., in the Douglas *cul-de-sac*, arched over by the posterior surface of the uterus, the promontory of the sacrum, and agglutinated convolutions of the small intestines. Sometimes, also, the sigmoid flexure of the colon forms a part of the wall of this cavity. In such a case the fluid could have been evacuated only by an opening *per vaginam*, into the Douglas *cul-de-sac*. In one of Mr. Wells's cases (No. 82) a pint of turbid serum, and in case No. 59, three or four ounces of pus, were thus enclosed. A similar cavity is sometimes found just behind the wound, so that pus cannot fall into the peritoneal cavity. In one of Hildebrand's cases, of double ovariotomy, when one of the pedicles had been ligated, and then transfixed by a lancet-needle, the pedicle retracted and formed a funnel-shaped depression, and the needle cut through. Death occurred from œdema pulmonum on the eighth day; when this depression was found still more enlarged by having arranged around its margin the intestines, omentum, and uterus, so attached as to prevent all communication of the pus-containing cavity with the peritonæum.[1]

Mr. Wells's one hundred and third case is also interesting in this connection. The pedicle had been ligated and returned. On the thirteenth day the symptoms of septicæmia induced Mr. Wells to make an examination *per vaginam*, when he found a fulness in the right side, and passed a straight trocar behind the uterus into Douglas's space and removed three and a quarter pints of abominably fetid, black, tarry fluid. Three days later, the trocar brought away a pint more of the same fluid, and two or three pints of it escaped during the next three days, and the flow continued up to the twenty-sixth day, when it stopped. The aperture of the opening was probed, but only one ounce of fluid came away. The patient died on the twenty-ninth day. The following conditions were found at the *post mortem:*

An incision was commenced at the left false-ribs, carried down to Poupart's ligament, across to the same ligament on the opposite side, and then upward to the right false-ribs. The incision implicated the whole thickness of the abdominal wall, including a layer of peritonæum. It was now found that none of the small intestines descended into the pelvis, but were firmly glued to the flap, which had just been formed. The position of the pelvic viscera, properly so called, was quite normal, except that the place of the left ovary was occupied by a little capsule of lymph, enclosing the ligatured stump. The recto-vaginal pouch was empty; a probe, introduced through the opening in the vagina made by Scanzoni's trocar, passed fairly into the pouch. The utero-vesical pouch was filled with creamy pus. It now became evident why so much fluid had been discharged whenever the position of the patient was altered. The pus in the utero-vesical pouch was prevented flowing into Douglas's space only by the ridge formed by the uterus and broad ligaments, and at every motion of the body a little of the fluid overflowed the barrier and gravitated into Douglas's space, whence it found a free exit. The large, irregular cavity was capable of holding about a gallon of fluid; during life it must have been full of air. It was bounded superiorly by coils of small intestines firmly adherent to each other and to the anterior abdominal wall. In the pelvis itself were no false membranes, with the exception of the few flakes of lymph partially incapsuling the pedicle, as has already been mentioned. On attempting to separate the intestines from the anterior abdominal wall it was found absolutely necessary to use the knife, as the adhesions would not give way to traction. It was then discovered that, although the intestines were for the most part firmly matted together, still at intervals pus had collected between the coils, forming a large number of small, circumscribed abscesses. One of these abscesses was immediately beneath the abdominal wound, which had perfectly united.[1]

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[1] Grenser, p. 58.

3. If death result from *hæmorrhage*, the blood is of course found in the peritoneal cavity, and mainly in the pelvis. Its source is in almost every instance at once recognized, whether it proceeds from ruptured adhesions, from the incision as in Dr. Bayless's case (p. 499), or from the pedicle. Grenser states that Wagner lost a case from hæmorrhage from the sub-peritoneal connective tissue—four handfuls of blood having been found in the pelvic cavity. I suppose he had not included the peritonæum in his sutures. In another case he found extensive compression-thrombus in the vena cava, and both renal and iliac veins; which, however, had probably existed for some time before the operation.

If the pedicle has been ligated, the ligature in case of fatal hæmorrhage may be found in its place, the pedicle having contracted within it, as in Mr. Solly's case; or it may have slipped off, either partially or entirely. In the latter case the portion of the pedicle which has been enclosed may have disappeared entirely, from retraction of its tissues, and only a fresh elliptical surface be seen, bounded by the cut edges of the broad ligament, which had been enclosed. If the ligature had but partially slipped, a portion of the pedicle is still surrounded by it, and the remaining portion extends like an incision to a variable distance from the ligature.

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[1] *Op. cit.*, p. 275.

It has been sometimes assumed that a collection of blood in the peritoneal cavity is quite harmless, since in these cases it is generally found not to have undergone any change, and may therefore, it is asserted, have been again absorbed. But it must be remembered that death occurs in cases of fatal hæmorrhage within from twenty-four to forty-eight hours after the operation, and before decomposition can ensue. Spiegelberg found the coagula were unchanged, even when death occurred in sixty hours. On the other hand, it is known that, after a few days, blood thus found does as a rule undergo decomposition, and thus produces septicæmia (p. 511).

4. The condition of the *pedicle* in fatal cases, when treated by ligature, has already been described on pp. 457 and 458, I here merely add an exceptional case (No. 60) in Mr. Wells's experience. The patient died in fifty-nine hours, from exhaustion and the rapid effusion of serum in the peritoneal cavity. "The tissue included in the ligature was dead and fetid, the dead portions weighing about half a drachm." This patient had been in a very low condition, no exudation at all having taken place around the ligatures. Sometimes, after a few days, the ligatures become so completely blended with the tissues as to be with great difficulty, or not at all, recognizable. Grenser mentions a case in which a ligature coming out through the incision had united so firmly with the intestine by fibrinous exudation, that strong traction was necessary to separate it. Another ligature applied to the omentum, cut short and returned within the cavity, could not, at the end of eight days, be found at all. Very seldom is any slough produced by a ligature, whether applied either to the pedicle or to an adhesion. This is far more common in cases in which the clamp has been used.

If the *extra-peritoneal* method of treatment has been resorted to, more or less deflection of the uterus will be found, Grenser thinks, in all cases unless the pedicle is especially long. If the pedicle is quite short, the uterus becomes deflected, elevated, or attached to the abdominal wound. But, if the clamp be used, mortification of the pedicle, if short, has not very seldom been produced by its traction. In one of Spiegelberg's cases, the clamp was loosely applied, and removed on the third day. The patient dying in ninety-two hours, two-fifths of an inch (one centimètre) of the pedicle was found mortified, with a sharp line of demarcation. Veit, of Bonn, had a case of double ovariotomy which proved fatal in fifty-seven hours, in which the clamp had slipped off the right pedicle, which was discolored and decomposed. In one of Simon's cases, the pedicle was first fixed by a clamp, and then ligated. The patient died on the sixth day, and thrombus of an artery and abscesses were found. Mr. I. B. Brown, in a case of double ovariotomy (case No. 57), ligated one pedicle and returned it, and applied the clamp to the other. The patient died on the fourth day, and the first-mentioned pedicle was healing, while the one treated by the clamp was gangrenous.[1]

5. The *remains of adhesions* are found after two or three weeks to have become absorbed, or to be attached to a convolution of intestine. Portions of the cyst left adherent to any organ remain unchanged, if the vascular connections are preserved.

6. After death from *tetanus* Mr. Wells found (Case 12) that the recti muscles seemed to have been torn across transversely for more than an inch, at a point almost an inch above the upper end of the incision. This was probably done by the violent spasms which arched the body upward. Whether this was also the origin of about one pint of dark fluid blood in the pelvis, or whether the latter had passed from some vein opened at the *post mortem*, Mr. Wells could not say.[2]

7. Death occurred forty-six hours after the operation in Mr. Wells's seventeenth case, from *intestinal obstruction*. The pedicle had been ligated and then fixed in the wound by a hare-lip pin. The following is his description of the relations of the parts as found at the autopsy:

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[1] "On Ovarian Dropsy," p. 199.

[2] *Op. cit.*, p. 49.

The anterior wall of the abdomen was very flaccid from previous excessive distention of the ovarian tumor. The recti muscles were also greatly hypertrophied, and their fibrous sheaths thickened, probably from the increase of function thrown upon them in supporting the large ovarian cyst. Incisions were made from the ensiform cartilage toward the anterior spines of each ilium, so as to reflect the anterior wall of the abdomen in a triangular flap downward over the thighs. The relation of the peritoneal aspect of the wound to the intestines, omentum, and parts concerned in the operation, was thus very easily seen. The incision made in the operation ceased about midway between the umbilicus and symphysis pubis, not coming so low down as usual. The upper third of the wound gave passage to a portion of omentum which had required the application of a ligature. The portion of gut to which it was attached was in close apposition to the inner aspect of the wound. The intestine, however, was not constricted; and the slight irritation at this point was entirely limited to the portion of omentum passing through the wound. The line of incision which separated the cyst from its peduncle was secured by whip-cord ligatures, and the tied portion of peduncle was brought out through the middle of the wound. The tumor seemed to have been fixed closely to the posterior aspect of the left side of the false pelvis, near the middle line, and at a considerable distance from the fundus of the uterus. From the uterus to the ligature of the peduncle, the distance measured an inch and a half; but the condensed tissue which composed the peduncle attached to the posterior wall of the false pelvis was almost sessile, having the left common iliac vein to its inner aspect. The ligatures securing this extensive incision were thus fixed near the posterior aspect of the false pelvis, a little to the left of the middle line; and toward this point the elongated peduncle from the fundus of the uterus was drawn, and secured by the one common ligature. Thus the body of the uterus came to be drawn obliquely upward out of the cavity of the true pelvis, and the common ligatures were brought out at the middle of the wound, instead of at its lower angle near the symphysis pubis, as has usually been the case. These arrangements and connections of parts caused the united incision through the abdominal wall to dip deeply into the cavity of the abdomen, and that portion through which the ligatured peduncle issued came to be nearer the posterior aspect of the pelvis. A space was thus left between the elongated peduncle from the fundus of the uterus and the abdominal wall. The space was closed at the upper angle where the ligature emerged at the middle of the parietal wound. In the space so formed a portion of the lesser intestine near the lower portion of the jejunum had become constricted. The mesentery of the small intestine resting on the ligature, the whole extent of ileum had passed through this space toward the right side of the abdomen, till the constriction became decided at the lower portion of the jejunum. A complete liberation of the ligatures holding the peduncle in the centre of the parietal wound, at once set free the constricted portion of the gut, showing it dilated and inflamed on either side of the constricted portion. Extensive inflammatory action had glued the convolutions of intestine to each other immediately above the constricted portion, and a considerable portion of fluid effusion filled the cavity of the true pelvis. There was no appearance of hæmorrhage having taken place. There was evidence on the parietal peritonæum of extensive adhesions to the cyst having been forcibly ruptured, and round these points considerable vascular excitement was manifest; and lymph was already in abundance commencing the healing process. No inflammatory action appeared to extend from these points, nor from the wound. Throughout all points where it was brought together, union by the first intention was rapidly proceeding. The hare-lip pins which had transfixed the peritonæum were completely concealed from view until the folds on each side were forcibly separated.[1]

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[1] *Op. cit.*, pp. 65, 66.

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